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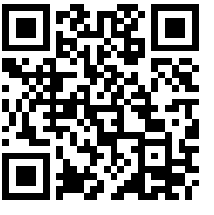

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AN INTERNATIONAL QUARTERLY REVIEW.

Containing Report of Proceedings of the British Electrotherapeutic Society.

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MEDICAL

Electrology and Radiology.

NO. 2. APRIL, 1903. VOL. IV.

ELECTRO-THERAPEUTICS AND ELECTRO-ETHICS.

BY EDMUND OWEN, F.R.C.S.

Honorary Member of the British Electro-therapeutical Society.

INASMUCH as the British Electro-therapeutical Society paid me last year the highest compliment in their power, namely, that of electing me an honorary member of their Society, I feel that their interests are to a certain extent my own, and that if, even in a small degree, I can do anything towards helping them to lift the practice of electro-therapeutics completely from the shady groves of quackery into the paths of professional rectitude, where it can stand in the light of day and not be ashamed, it is my duty to do so. And this, I take it, is the duty of each one of us. Of course, we all know that this branch of practice has never been entirely destitute of honest workers, but we also know that it has been over-weighted by charlatans and parasites of various sorts—a fact that should make each one of us extraordinarily circumspect and careful.

I am fully aware of the fact that I have neither the right nor the desire to pose as a censor of morals, but I think that I may go so far as to say that if medical men who practise, or who wish to practise electro-therapeutics, have really the good of their profession at heart, and are anxious to see their particular branch of it standing well with the profession, they should do their very best towards earning for it a good name. For electro-therapeutics has not got a good name yet. It is only just starting in life, as it were, and it has got to make a name for itself. It has a future full of opportunities. But it must not be in too much of a hurry. And the way to help to build up a good name for the Branch is by every electro-therapeutician on every occasion, great or small, saying to himself, "Is this making for the good name or not?"

Anything like puffing and quackery he should avoid as the devil avoids holy-water; these were part of the stock-in-trade of the chief mass of the unworthy people who preceded him, and who worked electro-therapeutics as a *trade*.

In the Address which I had the honour of giving before the Electro-therapeutical Society last autumn,[1] I said that as a

[1] *British Medical Journal*, January 3, 1903.

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legitimate branch of our Profession the practice of electro-therapeutics was in "very poor repute," and, judging from what I have lately seen taking place in the public press, I have at present, I regret to say, no reason for altering that opinion.

Making no claim whatever to a working knowledge of electro-therapeutics, and having no axe of my own to grind, I am able to regard the question of the ethical position of this science in a perfectly impartial manner—so far, at least, as a member of the medical profession and of the Electro-therapeutical Society can be impartial in a matter of general and special concern.

In a certain evening paper—I name no names—which was issued at the end of last February, appeared a lurid article heralding "a triumph of electricity." In it the writer said :—

> "Having enjoyed the privilege of being permitted many conversations with one of the first and foremost private medical men in this line—very few they be as yet—and of witnessing the practical demonstrations of this 'one' (who may in all truth be said to have advanced even a step or two further than any other), I detail in brief his remarks and explanations, believing that they may be found interesting and instructive, although the exigencies of professional etiquette demand that his name be withheld.
>
> "In a handsome house not a hundred miles from Hyde Park can be seen a room that may well be called the Doctor's electrical workshop, for he has been a zealous student of the science from his youth up. Here is gathered every apparatus that has yet been manufactured, for the '*X*-rays,' for the valuable 'Finsen light,' &c., for lupus, and for the still more valuable machinery, in full working order, for the treatment of cancer by 'high frequency,' and he proceeds to answer a few questions and to give some interesting information about his personal experience of such treatment."

Soon after the appearance of this ebullition a strange type-written supplement was prepared for issue. I neither know nor care to whom it was sent, but I happen to have a copy of it on my table. It runs thus :—

> "You ask me to tell you more about that new treatment for cancer of which I spoke in our mutual friend's drawing room ; but as nearly everyone who was present has made the same request, I am having an answer printed to send round to friends. It is called the 'High Frequency' treatment by electricity ; not the X-rays ; not the Finsen light. . . . but a much newer thing only discovered during the last few months. . . . It kills the germs of the disease, causing the fibres and feelers running to the cells, to, so to speak, loose their hold or grip

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> thus preventing them from sucking up fresh nourishment and generating new life. . . . The tremendous power of this 'High Frequency' treatment kills these germs at the very root of their cells. I wish that I could put it more scientifically and technically. It is being practised successfully at some hospitals, but very few private doctors have yet been able to go in for it. . . . so very few medical men are deep students of electricity. However, one of the first and foremost of these 'few' is Mr. So-and-So, of such and such an address." (Name and address duly set forth.)

To the end of this somewhat mysterious letter is appended the name of the lady who was responsible for it.

I have not a word to say against this lady, and I am in entire sympathy with her wishing that she "could put it more scientifically and technically." No doubt she is a delightful person, anxious to do what she can, to the best of her ability, to help those suffering from cancer and at the same time to do a good turn to Mr. A. B. C. who is, obviously, the hero of the evening paper puff, whose name, it will be remembered, "professional etiquette" demanded should be withheld—at any rate for a time.

One has no right to assume that the owner of the "handsome house not a hundred miles from Hyde Park," was a party to the puff oblique or puff direct. But whether he was, or whether he was not, he is equally deserving of pity.

In the beginning of March, in the evening paper before alluded to, appeared a letter from Sir William Church, who, as Chairman of the Executive Committee of the Cancer Research Fund, said, in his official position, that if

> "the anonymous doctor would lay aside 'the exigencies of professional etiquette' and submit any evidence he might have collected as to the value of high-frequency currents in the treatment of cancer to the Cancer Research Association, conducted by the Royal Colleges of Physicians and Surgeons, it would be carefully considered by persons competent to form a judgment on the nature of the cases treated and the validity of the reputed cures."

This was quite right; if any one was in possession of practical knowledge or experience in connection with the treatment of cancer, by all means let him bring it to a certain competent committee who were specially appointed to investigate the subject and were keenly anxious to bring forth some tangible results.

Below Sir William Church's letter appeared another which very properly did not bear the writer's name. It was, however, evidently from the pen of some one who knew what he was writing about—possibly from some member of our own Society. I know not. In it he said that it was

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"quite certainly as yet unproven that any one of the methods under consideration had *cured* a single case of cancer, for the simple reason that they had not been in use a sufficient number of years to permit a confident statement that any case of apparent cure, or arrest of the growth, was beyond the risk of recurrence. In some cases both these methods had failed.

"That what was wanted now in the public interest was a wide and impartial investigation, necessarily extending over some years, of the exact value of these methods. Do they only check the cancer or can they produce a permanent cure? The question, he maintained, pressed for solution. Its importance was recognised by most of the well-known London hospitals."

This letter stood over the modest signature *Medicus*.

Early in March also appeared a long essay on the light-cure of cancer which, in my opinion, was far more suited for a medical journal than for an evening issue from the lay press. In it the names as well as the works of various medical men were freely dealt with. In the last paragraph the writer said, "Cancer is being experimented with." That is quite correct, and anything more than this might well have been left unsaid. And perhaps also this statement might have been advantageously omitted.

An evening or two later appeared a letter from an *Electrician*, who said that he thought it was very wrong for any one to say that cancer could be cured by means of the X-ray, which, he fancied, he had demonstrated could not be done. Moreover, he was greatly alarmed at the way in which many inexperienced people are using the high-frequency apparatus which is so extensively advertised by dealers. He said that several of our hospitals were experimenting in a proper manner, and he trusted that before we were very much older a system which had just been introduced would be found very efficacious. He promised that it should be brought under the notice of the public

"in a proper way, and not as a thinly-veiled advertisement for one man, who did not live a hundred miles from Hyde Park."

Next came a signed letter from the Honorary Treasurer of the Röntgen Society, who apparently is not a medical man. He claimed that his Society had done a great deal in the way of investigating the phenomena connected with X-rays, and he very properly resented what he took to be a disparaging remark about it. He reminded his readers that though his Society had upon its list many members who are not medical men, still it possessed many X-ray workers who were on the medical register.

"I may add," said he, "that the Society, knowing that

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there are many subjects which medical men would not discuss before laymen, have a rule under which special meetings of its medical members can be held at their request."

It being clearly understood, therefore, that the question of the *treatment of disease* by the X-rays is a purely professional one, and that it ought to be discussed only by the medical members of the Society, the British Electro-therapeutical Society can have nothing but the kindest possible greetings for the mixed Röntgen Ray Society.

Though our Society is composed entirely of qualified medical practitioners, it arrogates nothing. It only insists that such subjects as the actual treatment of disease is not suited for discussion in a mixed society. And to this no one, I should think, could take exception.

In a more recent number of the evening paper, four letters appeared, one after another, the last of them being both short and silly.

Personally, I would have liked to see at an early date an editorial statement to the effect that no further correspondence on that subject could be published, for it could do no possible good in a professional sense, whilst, on the other hand, it seemed to be offering an opportunity for people publicly associating their names with electro-therapeutic work in a way which could not be to the advantage of our Society or to the welfare of electro-therapeutics in general.

But though, as I said at the beginning, I have no desire to pose as a censor, still I have no hesitation in bringing this short essay to a conclusion by giving a little wholesome and timely advice, which, indeed, is as applicable to members of the profession in general as it is to those of our Society. It is this, that if anyone has results to record—favourable or unfavourable—or any theory to advance in connection with the influence of electro-therapeutics in the treatment of cancer, or indeed, of any other disease, let him arrange to bring it before a meeting of medical men. But, above all things, let him honestly set his face against his name, his theory, or the estimate which kind and, perhaps, competent acquaintances have formed of his talents, being set forth in the lay press, or in type-written letters "to send round to friends."

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DOUBLE SARCOMA OF HEAD, FACE AND NECK.

By H. S. Boardman, A.M., M.D. (Montpelier).

In my note-book I find this case of malignant growth described, which was treated and cured in eight weeks during the past summer. Case No. 290. Mrs. E. W., Plainfield, Vermont.

History.—Family history good; aged 75. Eleven years ago had the right axilliary glands removed with *plasters*, and at the same time a small tumour just above the left ilium. Nine years ago she noticed a thickening of the tissues on the right frontal region. This growth went on for several months and the increase of tissue became quite noticeable; then it ceased to grow. Some months afterwards she noticed a similar growth developing upon the left frontal prominence, and this kept steadily increasing until it caused her so much anxiety that she consulted her family physician, who told her it would probably not amount to any more than the other had, and not to be troubled about it. The tumour kept on growing, however, and becoming alarmed, she consulted her physician again, who called in a surgeon. After making a careful examination, he advised an operation; but her family objected so strongly that the matter was dropped. Her physician gave her a prescription for her blood, which she took; meantime the tumour kept increasing, until it extended from the top of the head to underneath the chin, completely closing the left eye, and extending behind the ear.

When I first saw her the whole left side of her face was so enormously swollen that she did not look like a human being. She had not been able to see anything with her left eye for a year. Over the eye the flesh was red and glistening, and behind the ear it looked as if it might soon break. This growth was the development of eight years. Some two years ago she noticed an enlargement upon the *right* side in the region of the parotid gland. This tumour grew quite rapidly, extending up behind and in front of the ear, and down the neck and under the inferior maxillary to its centre, meeting the tumour on the left side. The swelling was as great within the mouth and throat apparently as externally.

From being a strong, vigorous woman, weighing 212 pounds, the disease had made such inroads upon her health that at the time of coming under care, May 16, 1902, she weighed only 180 pounds, was very feeble, and for months had not been able to rest at night save in a semi-recumbent position. Walking only a short distance induced severe dyspnœa and exhaustion. Her appetite very poor, the heart action was intermittent and irregular, and there was a distinct mitral murmur.

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The case had long since been pronounced a hopeless one by all the physicians and surgeons who had examined her, and the outlook was indeed discouraging.

On May 16, 1902, she came to me for examination. I examined both growths carefully, found the whole area covered by the tumours very hard, leaving a dead sensation to the touch. When I had finished the examination she asked me if I could do anything for her. I told her I could remove the tumours with X-rays if she would come to Montpelier and take treatment three times a week, and follow my directions to the letter; otherwise I did not care to have anything to do with the case. Two weeks afterwards I began treating it with the X-rays.

First treatment was given June 4, 1902. Patient seated twelve inches from the tube, with the entire face and forehead protected by thin sheet lead except the left frontal region, which was exposed to the the rays for six minutes. The machine used was a Van Houten and Ten Broeck twelve-inch plate, thirty-two-inch circles.

Second treatment, June 5. Examination showed no change in tumour. Patient seated six inches from tube. Time of exposure five minutes.

Third treatment, June 7. Examination at this time showed a slight softening of the tumour; also an improvement in the spirits of the patient, who was resting a little better at night. The patient was protected each time by a thin sheet lead mask except the portion exposed to the rays.

Fourth treatment, June 10. There was still greater improvement, the softening having continued. The portion of the tumour on the forehead at the commencement of the raying was red from congestion, but as improvement went on this gradually disappeared. Patient reported continued improvement not only in the quality and quantity of sleep obtained, but could rest with the head lower; the appetite was returning and the food taken with greater relish.

Fifth treatment, June 12. Since last raying there had been a marked softening of the tumour upon the forehead. The raying was beginning to tell upon the disease. This furnished the hope and conviction that science would in the near future triumph over disease.

It seemed that a case which had been for so long a time considered hopeless by physicians and friends was destined in a short time to confound even skilful surgeons, and this stimulated both patient and physician to persevere in the effort to remove this exceptionally large, malignant growth.

Sixth treatment, June 14. Since the last treatment the swelling had gone down so that the eye was beginning to open, and on the forehead the tumour was becoming quite flat; at this time she complained of a little smarting, as light

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dermatitis had developed. For several times the tube had been placed from six to eight inches from the patient. Appetite was much better, strength was increasing, could walk to and from the office with much less fatigue, rested well at night and was beginning to feel confident that she was going to recover. The improvement which went on between each raying was something marvellous. Both the family friends and the physician who was treating her looked on with astonishment. The skin at this time became brown and a little sore upon the forehead.

Seventh treatment, June 17. Tumour on the forehead quite flat, swelling about the eye fast disappearing, eye partially open, strength rapidly improving, appetite excellent, can breathe easier and lie lower in bed at night.

Eighth treatment, June 19. Tumour begins to grow smaller; patient can now see with the left eye as well as with the right. Since last raying the swelling about the eye had nearly gone, the skin beneath the eye hanging in folds, Nature being unable to care for the superfluous tissue as fast as the swelling disappeared. I now passed from the forehead and eyes to the face, and centred the rays upon it.

Ninth treatment, June 21. Diseased tissue of face much softer and smaller, the brown colour continuing.

Tenth treatment, June 23. Since last treatment there has been a rapid diminution in swelling of the face, skin is slightly wrinkled, discolouration increased. Tube distance ten inches.

Eleventh treatment, June 26. Skin upon the face quite wrinkled, swelling about the inferior maxillary and on the neck, within the mouth and throat much less.

Twelfth treatment, June 30. The face was now very thin with deep wrinkles across it. I now directed my raying to the region of the inferior maxillary and behind the ear.

Thirteenth treatment, July 3. The induration under the jaw was much less and it continued to grow less after the raying ceased on this side of the face.

Fourteenth treatment, July 5. With this treatment I commenced raying the tumour on the right side of the face.

Fifteenth treatment, July 7. No perceptible change.

July 9. Upon examination found there was a perceptible change, it was much softer and smaller, with less redness behind the ear.

Sixteenth treatment, July 11. There was now a wonderful change in the tumour for the better. It was rapidly decreasing in size, though it was very hard about and under the ear. It was evident now that all of the adipose tissue would be removed and nothing left but the muscle, skin and jaw. The brown shade of the skin was now spreading over this tumour also.

Seventeenth treatment, July 14. Tumour on right side of

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neck nearly gone, the hardness under the jaw softening and disappearing. Tube was placed near or far from patient according to the condition of the skin, ranging from five to fifteen inches.

Eighteenth treatment, July 17. This was the last X-ray treatment. This tumour had now entirely disappeared. I now limited my raying to the region under the inferior maxillary, and with this treatment I closed the raying.

From first to last there had been a steady improvement, whether perceptible or not. The patient's faith increased from day to day in the ultimate success of the treatment; her health began to improve from the first, and with it her courage. The battle had been sharp and decisive. Science had won a brilliant victory over a malignant disease and won under adverse circumstances.

Nineteenth treatment, July 18. I now began a course of eight treatments of the Franklinic current, negative insulation, for the general tonic benefit. Her improvement in strength was rapid, as was her health in general. I dismissed her July 24, after two months' treatment. I never saw any one so rejoiced as she was to regain the sight of her left eye which was even better than the right eye. Her improvement had been so great that on her return home she was not recognised by friends and neighbours. She spent the next few weeks renewing old acquaintances; for owing to her physical condition she had hitherto secluded herself from society.

CORRESPONDENCE.

BLISTERS AND HYPNOTIC SUGGESTION.

To the Editor of MEDICAL ELECTROLOGY AND RADIOLOGY.

WITH reference to the offer referred to in your current issue of a Wisconsin doctor who is willing to pay two hundred dollars for a subject on whom he can demonstrate the production of blisters or permanent anatomical changes by hypnotic suggestion, I think he will be fortunate if he obtains what he wants at so small a cost.

I have been using hypnotism in medical practice for about fifteen years, and during that time have hypnotised many hundreds of people, good, bad, and indifferent hypnotic subjects, but I have never had the good fortune to come across a subject upon whom such advanced physical phenomena could be produced by suggestion.

Nevertheless, I do not doubt the occasional occurrence of such phenomena any more than I disbelieve in the artificial production of diamonds in the laboratory, though on the only

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occasion upon which I saw the attempt made, by Sir W. Crooks at the Royal Institution, the experiment failed. It is a question of evidence and credibility, and anyone who doubts the testimony afforded may certainly be considered hypercritical.

The late Sir B. W. Richardson, reviewing my book on hypnotism[1] in the *Asclepiad*, referred to Liebeault's case, in which a blister resulted in a few hours in obedience to the suggestion that a postage stamp applied to the neck was a blister, and explained the occurrence by attributing it to the bad gum used on postage stamps. Surely rather a far-fetched idea, even if the case were an isolated one, and quite discounted by other cases in which no such application was made. For instance, I have before me the photographs of Dr. Wetterstrand's case. The subject was a morphinomaniac, aged 45. She was hypnotised by Wetterstrand at 3 p.m. and he suggested that she should feel a burning sensation when he placed the points of his fingers on the back of her right hand; two hours afterwards the blisters rose and were photographed. Four Swedish doctors were present the whole time.

The late Professor von Krafft-Ebing, of Vienna, records in a special monograph[2] a series of experiments he and others carried out in a highly sensative hypnotic subject, Thua Szaudor. This girl was so susceptible to suggestion that the effects of a severe burn followed the application of the blade of a pair of scissors—cold, of course—when it was suggested that it was red hot. The wound, he says, took several weeks to heal. Binet[3] and Feré give several well-authenticated similar instances occurring in the cliniques of Charcot, Dumontpalier, and other eminent physicians; and on the other hand, Alfred Fouillée, in the *Revue des Deux Mondes*, May, 1891, relates a case in which the effects of a real blister were nullified by suggesting to the hypnotised subject that it was an inert application.

Consideration of this point illustrates one of the difficulties of hypnotic practice. Many people, including some medical men, suppose that either hypnotism should work practical miracles, or be branded as a fraud. "I'll give you five pounds," shouted a doctor from among a medical audience for whose edification I was, in the days of my early enthusiasm, demonstrating some common hypnotic phenomena, "if you will hypnotise me here on the spot at once." I had been labouring to impress the fact that one needed the subject's co-operation to achieve any result.

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[1] "Treatment by Hypnotism and Suggestion," 4th edition, 1900.

[2] *Eine experimentelle Studien auf dem Gebriet des Hypnotismes*, Stuttgart, 1889.

[3] "Animal Magnetism." Kegan Paul and Co., London, 1887.

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Though about 80 per cent. of ordinary people are more or less susceptible to hypnotism and suggestion, only ten or twelve of these are influenced by anæsthesia and amnesia on waking. A still smaller number are susceptible to more advanced suggestions, such as hallucinations of sight and hearing, and post-hypnotic automatism. I should consider myself fortunate if out of many hundreds of *somnambules* I found one in whom such phenomena as the production of a blister or of hæmorrhage from a mucous surface could be induced by suggestion. But the effects of suggestion vary more in degree than in kind. Even in only slightly hypnotised persons a responsive glow or blush is felt by the subject when the operator places his hand or some object, such as a book, over the epigastrium and suggests warmth. The old mesmerists attributed this effect to the passage of magnetic fluid, but we know it to be subjective, and the result of suggestion acting on the local vasomotor system through its central representation in the brain. Liebeault attaches great importance to the attainment of this glow of warmth, as it shows we can influence organic processes and so affect the innervation and nutrition of the part. I nearly always find I can remove pain, especially of a neuralgic or rheumatic character, at any rate for a time, by this suggestion of local warmth. One sometimes sees slight redness follow the suggestion of local warmth in a highly sensitive subject when the hand is applied for some length of time, and this is a stage in advance of the simple flush or glow. Just as there are successive stages in the medical and physiological action of belladonna and other drugs, so there are degrees in hypnosis and suggestion.

As some persons are profoundly influenced by certain drugs—I know one lady who cannot take a minute dose of belladonna without symptoms of poisoning—so idiosyncrasy must be considered in hypnotism, and such cases as those referred to must always be extremely rare.

In regard to the other points raised by Dr. Madden, I am less able to express an opinion. The influence of the mind on the course of disease is now generally recognised, and though I doubt whether to "think cancer" could produce cancer, everyone knows how bad mental conditions exaggerate that and other diseases. Most of us are acquainted with cases in which warts have been "charmed away." This use of "charm" is a form of suggestion, and is probably successful according to the faith and suggestibility of the patient.

C. Lloyd Tuckey, M.D.

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Reviews and Notices of Books.

LEHRBUCH DER HYDROTHERAPIE. von Dr. B. Buxbaum. (Leipzig: Verlag. von Georg Thieme.)

THE name of Dr. Buxbaum is familiar to students of hydrotherapy as that of a distinguished disciple of Professor Winternitz, and the author of some interesting contributions to the periodical literature of the subject. The work before us is a systematic text-book, presenting with true German thoroughness the results of a wide and varied experience. The work is divided into three main sections, the first dealing with the physiological basis of hydrotherapy—its influence upon innervation, circulation, temperature and metabolism; the second gives a methodical account of the various procedures; and the third deals with the hydrotherapeutics of various diseases. The second part includes, in addition to the description of the usual hydriatic procedures, strictly so-called, an account of the steam, light, heat and light, sand, and mud baths. Among the many diseases dealt with in this volume, we note with special interest the chapters on the physical treatment of phthisis. The point of view taken here is that of Cornel's dictum, that the therapeutics of phthisis must be an intensified hygiene. The "hardening" of the patient is a consideration that must be kept constantly in view, and only second in importance to this is the improvement of the circulation in the affected organs. The technical section of the book is well, but by no means profusely, illustrated. Altogether the volume is one which may be cordially recommended to all those (too few, we fear, in this country) who have any interest in the subject with which it is concerned.

C. J. W.

L'ANNÉE ELECTRIQUE, ELECTROTHERAPIQUE, ET RADIOGRAPHIQUE. By Dr. Foveau de Courmelles. (Ch. Beranger, Paris.)

Once more Dr. Foveau de Courmelles' interesting and instructive Annual is before us. This is the third year of its existence, and everyone interested in the questions it so fully and lucidly deals with looks forward to the appearance of the *Année Electrique* as one of the regular and important events of the early year.

The latest electrical theories; the newest electrical facts; fresh pages in the histories of light and heat, both in their scientific aspect and medical application; telegraphy, wireless and otherwise; electricity in war; electrical accidents; electro-, radio- and photo-therapeutics; electricity in its legal aspects; all come under notice in the 300 pages of this work. It offers

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not only a bird's eye view, but a searching insight into everything that has proved of interest or importance during the past year.

THE "TREATMENT OF MALIGNANT GROWTHS BY X-RAYS"; "RADIOTHERAPY FOR CANCER AND OTHER DISEASES"; "RECENT ADVANCES IN ELECTROTHERAPEUTICS."

These papers, by Dr. W. J. Morton, of New York, have recently been reprinted. It is needless to say that they are at once interesting, original and practical, and altogether form excellent reading. Closely connected with the name and fame of the same writer, comes the Report of the Special Committee of the American Electrotherapeutic Association on the Static Induced Current.

JOURNAL DE PHYSIOTHERAPIE.

We welcome the revival of a name recently discarded by us for reasons previously explained. The names that appear upon its scientific committee, the fact that its founder and director is Dr. E. Albert-Weil, as well as the contents of its early numbers, are a sufficient guarantee that the *Journal de Physiothérapie* will meet with the success it certainly deserves.

ANNALI DI ELETTRICITA MEDICA E TERAPIA FISICA.

This monthly is in the second year of its publication, and under the able editorship of Drs. F. Piccinino and A. di Luzenberger, with a distinguished list of "collaboratori," is full of life and promise.

Digest of Current American Medical Literature.

ROENTGEN RAY.

ACTION OF X-RAYS.—Zeisler, in an article entitled Radiotherapeutic Observations, states that if he were to attempt an explanation of the beneficial action of the X-rays in the cases treated, he would surely side with those who deny any particular effect on micro-organisms, but who, basing their opinion on microscopical evidence, as does Scoltz, attribute to the rays a special affinity for pathological cell formations, which under the influence of the rays, undergo metabolic changes and even entire disintegration. His experience with the X-ray has made him a devoted advocate of its use, and he believes it will constitute one of the most effective weapons in our fight against a large class of dermatological affections until something even more remarkable in its action is dis-

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covered.—*Journal of the American Med. Assoc.*, February 21, 1903.

THE RÖNTGEN TREATMENT OF MALIGNANT DISEASE is discussed by Leonard, who believes that the best method of treatment is a combination of early radical surgical operation and the Röntgen treatment. He finds that the curative action of the Röntgen ray is not uniform, and that those growths possessing the least tendency to metastasis apparently yield most readily. On the other hand, they are the growths most readily cured by operation. He regards the action of this energy as stimulant, alterative or destructive, according (1) to the nature of the individual tumour and its host; and (2) to the amount of the agent employed. Both of these factors as yet are difficult to measure, and cannot be determined accurately for different individuals and different types of apparatus. Whether the action is stimulant, alterative or destructive, it is only a difference in degree, not in kind.—*Phil. Med. Journal*, February 14, 1903.

THE PRINCIPLES OF PROTECTION AGAINST RÖNTGEN LIGHT DERMATITIS.—Beck points out that short exposures are the best safeguard against injury. The various contributing factors in the production of this dermatitis are discussed, viz., the construction of the tube, the penetrating power of its light, the distance from the irradiated body, the position of the object, the number of interruptions and the size of the secondary coil. So far as exposures for diagnostic purposes are concerned, Röntgen ray idiosyncrasy, he thinks, does not require much attention, as the exposures are so short, but in therapeutic work the possibility of individual susceptibility deserves attention.—*Medical Record*, January 31, 1903.

RÖNTGEN RAY LIGHT IN DISEASES OF THE SKIN.—In a contribution to the subject of radiotherapy and phototherapy in carcinoma, tuberculosis and other diseases of the skin, Hyde, Montgomery, and Osborne discuss the literature of the subject and give a number of case histories and illustrations. Definite conclusions cannot yet be reached as to the value of these agents in all the affections in which they have been used. From their experience, they regard these methods of treatment as superior to any other in the treatment of tubercular affections of the skin, while in lupus erythematosus, phototherapy has given very satisfactory results. In many cases of circumscribed lesions, removal by the knife or curette followed by a series of X-ray treatments is recommended. In operable carcinoma of the skin involving deeper tissues. complete extirpation followed by X-ray treatment is recommended. In their opinion the greatest of all the dangers in the X-ray treatment of carcinoma and one

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which has not been seriously recognised, is that of exciting an inflammation which encourages extension of the growth to normal or inflamed tissue surrounding the growth and favours metastasis. In tuberculosis of the skin the results of phototherapy are as rapid as those obtained with the X-rays, but with better cosmetic effect and without danger of deep burns. They finally point out that phototherapy and radiotherapy are valuable additions to our methods of treatment in certain diseases, but are of the opinion that great harm can be done in the hands of the unskilled and unscrupulous.—*Journal Amer. Med. Assoc.*, Jan. 3, 1903.

THE X-RAY IN GLEET.—Eberhart reports a series of nine cases treated by means of the X-ray. The duration of the disease varied in the different cases from a few months to many years. Exposures were made daily at first, subsequently every other day. In the nine cases reported, from three to fifteen exposures were made, lasting from five to ten minutes. Improvement was noticed after the first to the seventh exposure. In some cases the discharge stopped after the first exposure; in others, from the third to the fourth. Case 2 reported that the discharge stopped after the third treatment, and on his return for the fourth treatment stated that the preceding night was the first time in fifteen years he had passed without getting up to urinate.

Microscopical examination in Case 6 revealed the presence of gonococci prior to X-ray treatment. Under treatment the symptoms disappeared; also a herpetic eruption at the back of the glans, but the writer does not state whether the gonococci had disappeared or not. Of the nine cases all were improved save Case 3. In this case seven treatments were given without benefit. It was then discontinued.

Technique.—The patient is placed on his back with the legs flexed and spread apart. The penis and scrotum are drawn up on the abdomen, the patient grasping one testicle in each hand and drawing them apart. Strips of sheet lead are then adjusted, so that only the ventral surface of the penis and perineum are exposed to the rays. A low tube is used on a 110-volt circuit and about 1½-ampère current. Vacuum tube discharges are applied for a few minutes subsequently to the X-ray treatment. The suggestion for the use of the X-ray in gonorrhœa was made by Frankenstein of Chicago, and Eberhart in undertaking the work based his opinion as to the *rationale* of the method upon the general inhibiting action which the ray had upon the formation of pus.—*Am. Electro-Therapeutic and X-ray Era*, February, 1903.

NOTE.—For the past ten years I have treated the same condition in women with soluble metals, preferably silver, or silver

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in solution, at the positive terminal of a continuous E.M.F., driving the silver salt into the tissues by cataphoresis with unvarying success. In the light of the experience of Eberhart, the treatment of future cases should be undertaken with the X-ray. With the modified water-jacketed vaginal X-ray tube in daily use the applications can be made with great facility. As these tubes are not of high vacuum they are especially adapted to mucous membrane contacts.—*The American Editor.*

X-RAY TREATMENT IN ACNE AND SYCOSIS.—Pusey reports three cases of hypertrichosis complicated by acne, which had been under treatment for hypertrichosis by means of the X-ray for a year. The exposures were made at irregular intervals during the year. The skin in each of these cases is smooth and soft, and the result is satisfactory from a cosmetic point of view. Case 3 had been under his care for several years for acne, but nothing had ever controlled it. From the production of the first X-ray erythema, September, 1901, she has had no acne lesions. In the other cases the acne disappeared while the hypertrichosis was being treated. Seven cases of acne alone were subsequently treated, and Pusey states that if conclusions can be drawn from so small a group, the method is in advance over any other way of treating acne with which he is acquainted. The indications to be met by the use of the X-ray are to cause atrophy of the dilated sebaceous follicles, and the prevention of pus formation. The results from the X-ray treatment of acne are more quickly obtained than in any other condition, and with less effect upon the tissues than he would have thought possible. The treatment has been suspended in each case with the appearance of pigmentation or erythema, and in no case has improvement failed to appear simultaneously with the development of these evidences of the effect of the X-ray upon the tissues. A soft tube is used, with as weak a current as would illuminate it. The greatest care—because of the cosmetic nature of a condition like acne—must be taken to avoid untoward effects. A case of sycosis is also reported. Here the same two properties of the rays utilised in the other cases, *i.e.*, inhibiting the formation of pus and causing atrophy of the follicles of the skin, come into play.—*Journal of Cutaneous and Genito-Urinary Diseases*, May, 1902.

ACNE.—The actinic rays of light have been found of much value in acne. Finsen reports fifteen cases of acne, and rosacea, four of which were cured, five greatly improved, and one under treatment. The remaining five discontinued treatment early; actinic light has been of value also in the experience of the writer in very obstinate acne, which would not yield to any form of local or constitutional treatment. Under

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the influence of light the pustules disappeared, and the face cleared up in a few weeks' time.

NOTE.—This only illustrates again the similarity of physiological action of the vibrations of ultra violet light and the Röntgen ray. By using a soft tube, weakly illumined, the energy more nearly approaches that of the high frequency vibrations of light. It becomes then a matter of choice with the physician as to method, and the results will depend upon the perfection of mechanisms used, and the skill and judgment with which the applications are made.—*The American Editor.*

PHOTOTHERAPY.—Bleyer reports in an article *on* the solarisation of the nude body by the sun and electric arc rays, and the physiological and physical influences of these rays upon iron preparations after their internal administration, that all the per-salts of iron (when in combination with organic matter) are converted into proto-salts by exposure to sunlight and the electric arc light rays. He found that in over a hundred tuberculous and anæmic patients, to whom the different iron salts and organic preparations of iron were administered, the blood count, under daily exposures to the action of the sun rays and electric arc rays, showed marked improvement in the number of erythrocytes and hæmoglobin. The increase (according to Bleyer) was enormous in comparison with previous counts in cases treated by older methods and was most marked with the hæmoglobin.—*Medical Record,* January 31, 1903.

THE HENRY PHIPPS INSTITUTION FOR THE STUDY, TREATMENT AND PREVENTION OF TUBERCULOSIS.—The purpose of this institution, says Flick, is the extermination of tuberculosis. Prevention will be the ultimate object and to that end the establishment will be planned and operated. The institute will consist of pavilions with a capacity of a hundred beds, well-equipped laboratories, facilities for hydrotherapeutic and phototherapeutic work, as well as any other accessories necessary for carrying out its plans. The pavilions will be built with balconies and a roof garden, so that the patients can be kept in the open air as much as possible. The wards and balconies will be so arranged that every bed can be run out on a balcony and the patient kept in the open air night and day if necessary. Facilities will be given for testing all new ideas in the treatment of tuberculosis which have a scientific basis.—*Philadelphia Med. Jour.,* January 31, 1903.

OPEN-AIR TREATMENT FOR SYPHILIS.—Douty recommends the open air treatment for early cases of syphilis. In his experience such patients do extremely well in certain Alpine heights. Coincidently he mentions that the percentage of syphilitics among phthisical men is extraordinarily high,

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and that the stamping out of the latter condition cannot be accomplished without directing means to stamp out the other and greater scourge (syphilis); and that while the latter is plentiful tuberculosis will flourish. His contention is that it were well if we did exactly the same with early cases of syphilis as with early cases of tuberculosis.—*Medical Record*, January 31, 1903.

ELECTRICITY.—Static electricity in the treatment of morphinism is considered by Pressey, who finds it of service in helping to keep patients in a comfortable condition while the morphine is being reduced. He regards it as a good nerve tonic, and states that the better and more rapidly will the nervous system recuperate, the nearer a patient is kept to a condition of ease and comfort.—*Journal of the Am. Med. Association*, January 10, 1903.

DIET.—Clark, in a *note* on the salt starvation principle in epilepsy, urges the importance of the hypochlorisation of diet in conjunction with the bromides and organic bromine salts in its treatment. Most epileptics, he finds, are fond of table salt; therefore he believes that the normal table salt should be withdrawn, thereby reducing the total chlorides in the body. Sodium bromide, nearest in taste to sodium chloride, should be administered in its stead. In addition to hypochlorisation of diet, general hygienic treatment, massage and hydrotherapy should be employed. He has found this line of treatment advantageous generally, the patients remaining free from bromism, from gastric irritation, constipation and the mental hebetude common in the old forms of bromide sedation. In the hypochlorisation of diet he believes a distinct advance has been made in the treatment of epilepsy. —*New York Med. Journal*, January 10, 1903.

Electrostatic Treatment of Cutaneous Diseases. By Ferdinand Winkler, *Annales d'Electrobiologie*, 1902, No. 5.

In this report, presented at the Seventy-third Session of German Naturalists and Medical Men, the author has studied the indications and contraindications of Franklinisation in the treatment of skin disease. This method of treatment, which was in the first instance employed and described by Prof. Doumer (Lille) ten years ago, has undergone considerable extension, and considering its usefulness it is to be regretted that it is not more extensively employed by dermatologists. It gives its most brilliant results in skin diseases which are more or less acute in character; its effects in acute eczema being truly remarkable. From the first or second application of the electric souffle the erythema becomes less

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marked, the itching diminishes or disappears, and the secretion dries up; and it is not an uncommon thing to see large eczematous patches thus cured in a few days. Static effluvation, as Doumer has also shown, acts well also in impetigo, some forms of chronic ulcer, and various conditions accompanied by itching. The effects are less marked but still interesting in lichen and vitiligo. The author then examines various hypotheses to explain these effects.

Metritis and Fibromata Treated by the Method of Apostoli. By Dr. Thielle (Rouen), *Annales d'Electrobiologie*, 1902, No. 5.

The author reports twelve cases of pelvic disease treated by electricity with varying success. It is, however, to be remarked, that notwithstanding the above title, he does not exclusively employ the treatment by high intensities (method of Apostoli). He has also used moderate intensities of from 20 to 40 milliampères, as well as Faradaic currents. All the applications were either intrauterine or intracervical. The results have, as a rule, been good, especially in dealing with metritis and endo-metritis.

Note upon the Action of Cutaneous Faradisation in the Treatment of Dermatoses accompanied by Pruritus. By Dr. Bouveyron (Lyons), *Annales d'Electrobiologie*, 1902, No. 5.

The author considers that the usefulness of this form of treatment is enhanced by the fact that it is in the hands of every medical man. He has employed it with success in lichen, eczemas, and pityriasis.

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PART II.

PROCEEDINGS OF THE BRITISH ELECTROTHERAPEUTIC SOCIETY.

Edited by CHISHOLM WILLIAMS, F.R.C.S.Ed., *Hon. Sec.*

JANUARY 23, 1903.

THE Annual Meeting was held at the Rooms of the Medical Society, 11, Chandos Street, W. Dr. W. S. Hedley, the President, occupied the chair.

Mr. Edmund Owen was duly elected an Honorary Member.

Drs. J. S. Hooker, Gloucester Place, W.; J. S. Clayton, Accrington; R. B. McNittie, Dublin; H. A. Cruttwell, Bagshot; W. Martin, Newcastle, were elected members.

Dr. W. S. HEDLEY then gave his Presidential Address reported in the January number of this Journal.

The following officers were then elected for 1903:—President: Dr. Lewis Jones; Vice-Presidents: W. F. Brook, Swansea, Donald Baynes; Council: W. Armstrong, Buxton, J. Allan, David Arthur, G. B. Batten, James Barr, Liverpool, J. A. Codd, Wolverhampton, S. Sloan, Glasgow, George Herschell, C. R. Lyster, R. Morton, Taunton, Milne Murray, Edinburgh, S. Sunderland, E. W. Shenton, E. Solly, Harrogate, Hugh Walsham; Treasurer: Dr. H. McClure; Honorary Secretaries: Chisholm Williams, F.R.C.S.Ed., Hall Edwards, Birmingham.

Dr. Lewis Jones was then duly inducted to the Chair as President for 1903.

The meeting then closed with a vote of thanks to the retiring President and officers of the Society for 1902.

FEBRUARY 27, 1903.

The Eleventh Meeting of the Society was held at 11, Chandos Street, Cavendish Square, W. The President (Dr. Lewis Jones) occupied the chair.

Twenty-three members and seven visitors present.

Several nominations were read and laid on the table for signature.

The ballot was taken and proved unanimous in favour of:—Drs. George May Lowe, Lincoln; Alexander Lane, Sunderland; Ellis Pearson, F.R.C.S., Bideford; F. J. Brown, M.R.C.S., Newark-on-Trent; A. H. Vernon, F.R.C.S., Boscombe; J. S. Maynard, 4, Charles Street, W.

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Dr. GEORGE HERSCHELL then read a paper on "Polyphase Currents," and gave an exhibition of the various appliances employed.

The PRESIDENT, and Drs. MCCLURE and BATTEN discussed the paper. Dr. GEORGE HERSCHELL replied.

Dr. W. F. SOMERVILLE (Glasgow) then read a paper on "Notes of a few Cases treated with benefit by High Frequency Currents":—

Mr. President and Gentlemen,—I desire first to acknowledge the honour you have done me in permitting me to read to you this evening, notes of a few cases that have benefited under my hands by treatment with the high frequency currents. It is with some diffidence that I submit these notes to your attention. I am quite aware that many, if not most, of you are much better acquainted than I with this form of treatment, yet in a comparatively young Society like this, where we are all engaged in investigating the influence of the various forms of electricity on the activities and functions of the human body, it may be permissible for me, though so recently elected one of your members, to report a few of my successful experiences. In doing so I propose to relate results rather than to discuss theories. The facts must stand for what they are worth. I neither venture to explain them nor to make them the basis for any speculations or hypotheses. It is much to be desired that the merits of the high frequency currents shall not be urged beyond their legitimate claim. Both experience and analogy teach, that a suggestion that any single form of treatment possesses a monopoly of therapeutic virtue is one at which time sooner or later mocks. It is an equal lesson that an unduly conservative attitude towards new therapeutic agencies may succeed in depriving the profession of valuable alternative methods of relieving pain and suffering, and may thrust into unworthy hands agents which need careful and scrupulous control. In stating my own observations, I am doing so, not as the partisan or advocate of high frequency currents in opposition to other forms of treatment, but merely as a physician anxious to define for himself, and if possible also for others, the practical ends it is possible to attain by the use of electricity in the treatment of disease. The one general remark I allow myself in reference to the cases here reported is, that it is worthy of note that many of them belong to types of disorders which, without endangering life, cause much suffering, and are as a matter of common knowledge and experience difficult to treat with success.

Let me take first of all that group of cases that may be termed the neuralgias. From among this group I select first, two cases of sciatica. One of these, sent me in September last by Dr. Tom Forrest and Dr. Crawford Renton, was a young gentleman, of about 20 years of age, who had been thrown

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while playing football sixteen months previously. As a consequence, he became subject to severe pain in the right sciatic nerve. So extreme and so obstinate was the pain, that the question of operation had been considered. As the pain, however, was constant night and day, it was thought that few, if any, adhesions were present, and stretching of the nerve was consequently not advised. I was therefore asked to try the effects of the high frequency currents. I am glad to say that after ten visits the pain in the nerve had entirely ceased, the patient could walk with perfect comfort, and I was able to flex the thigh on the abdomen with the knee fully extended and the toes flexed on the shin, till the limb was at right angles to the trunk. At the end of January slight pain or rather stiffness returned over the right gluteal region, which was again speedily relieved by electricity. Dr. Forrest writes me under date of February 4: "I saw our patient yesterday, and find that he is better than he has been for two years. There is free movement and absence of pain, and we have every reason to congratulate ourselves on the result of the treatment."

The second case was that of a burly farmer, his age about 46. This patient had been suffering from sciatica of the right lower limb for six months. The pain was constant, and he was unable to lie, still less to turn in bed, without suffering. Here again after eight visits he was cured. I was able, as before described, to flex the thigh on the abdomen without pain, and the man himself could adopt all attitudes capable of putting the nerve on the stretch without discomfort—in short from being a comparative cripple, he was dismissed in a condition quite fit for his work as a farmer. I saw this patient last week, three months after treatment was discontinued, and found that, with the exception of an occasional slight stiffness of the limb, he is quite well and free from pain. This method of treatment is sometimes scornfully described as suitable only for hysterical women. My friend from the country was much amused when I mentioned this to him, and he agreed with my comment that there did not seem to be "much in the way of hysterics about him."

Another neuralgic case I may refer to is that of a lady, both of whose breasts had been removed by a surgeon on account of cystic disease. For two years there had been more or less constant pain down the left arm from axilla to fingers. I am glad to be able to state that here also the pain was removed by the high frequency currents. After the lapse of ten weeks the pain has not returned. I have had one case also of neuralgia of the anterior crural nerve in a lady of about 30 years of age. The pain had been present for two or three months, yet it yielded promptly and satisfactorily to treatment.

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The benefit to be derived from the high frequency currents was also well illustrated in a case of intercostal neuralgia. This lady, aged about 57, had during the summer experienced much pain along the course of the lower left intercostal nerves extending well down the abdominal wall. Liniments and massage had little effect. During August and September, while in the country, she was practically an invalid, and from being a lady of active habits was compelled to keep her bed, as she became tired and exhausted on any slight exertion. The patient was very stout, and without the use of chloroform it was impossible to make a thorough examination of the abdomen, yet though the condition gave rise to unpleasant suggestions of the presence of a neoplasm, nothing could be detected. Very quickly under high frequency treatment the pain disappeared, and after eighteen visits she was able to resume all her active habits.

It has been generally found by those who employ high frequency currents, that cases of internal hæmorrhoids yield to this electrical treatment. Not only is the "Dean couch" employed, but an electrode is passed into the rectum—a proceeding entirely unaccompanied by pain. I was greatly struck by the benefit resulting from electricity in the case of a gentleman about 40 years of age, sent me by Dr. Alex. Thomson of Glasgow. In this case the hæmorrhoids appeared externally, and there was much local congestion, bleeding and pain. The ordinary local measures were at first employed, but when the patient was able to move he was sent to me for treatment. After the second application he came saying he was a new man, all pain and discomfort, except in the act of defæcation, had gone. After eight visits he had no more bleeding and no pain, either while walking or at stool; and Dr. Thomson told me that on examining him he was surprised to find that the piles had lost their velvety character and had become hardened and shrivelled. This was in the middle of September, and there has been no relapse. In a note to me of date February 5, Dr. Thomson wrote that he had again examined this patient at the end of January, and that he had found the hæmorrhoids to have further contracted and to be still no source of trouble. I have had equally satisfactory results in three other cases. I may here add, however, that in a case of prolapse of the anus I completely failed, though treatment was pursued for over three weeks.

While referring to hæmorrhoidal cases, I may say that in varix of the legs marked improvement occurs from this form of treatment. It has usually been held that the high frequency currents have special influence on the vasomotor system, and I have had reason from personal observation to believe this. A lamplighter consulted me some time ago regarding the varicose condition of his legs. The veins were very swollen

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and tense, and there was present a moist eczema with intolerable heat and irritation. To order rest was useless, for as lamplighter in an extensive district he had necessarily a great deal of walking. When I obtained the "condensing-couch," I employed it in his case with delightful results. The heat, irritation and pain disappeared, and though the veins are of course still large, they are by no means so tense as they were at first.

Another case of well marked varix of the legs in a ponderous lady of about 46 was greatly benefited. Before treatment she was unable to walk, or even to stand, without great discomfort, which also continued during the night, and prevented sleep. After several visits she was able to move about with ease, and even to climb stairs without complaining. The beneficial effects on her generally can be well understood, for free locomotion during the day and undisturbed nights gave rise to an improved state of her general health. She was one of the patients, too, who suffered from hæmorrhoids, and the improvement in the varicose condition both of limbs and of bowel was equally marked.

It has been found by some that high frequency currents have a curative effect on skin diseases, such as eczema, psoriasis, etc. A very marked case of the latter affection came to me in November. The disease was widespread, but was especially in evidence over the lumbar and gluteal regions and the lower limbs. The patient, a lady of about 55 years of age, had in addition polyuria, 150 ounces of urine without any trace of albumen or sugar being passed daily, and in addition she suffered from great insomnia, possibly due to the skin irritation, and general nervousness. She was almost entirely confined to bed, the distribution of the skin eruption preventing her from walking or sitting with any comfort. The disease yielded in a most remarkable fashion. Very shortly after commencing treatment the scales began to be shed, and clear skin to appear through the patches, till finally, after about twenty-four visits, the eruption had almost entirely disappeared from the legs, and the large patches over the hips had greatly cleared up. Further, the quantity of urine voided fell to about 50 ounces in twenty-four hours; the insomnia gave way to great desire for sleep, so that the patient not only slept continuously for hours during the night, but was disposed to be somewhat sleepy during the day; the general irritability also greatly lessened, and she became much more cheerful in manner. Locomotion was so much improved that she was able to walk with ease, and were it not that she is suffering from malignant disease, for which she had undergone operation a few months previously, the improvement in her general health would have been more noticeable. I have recently learned that after a period of twelve weeks the skin is now completely free from

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any eruption. I am quite aware that psoriasis not uncommonly disappears spontaneously, yet in this case, though the eruption had been continuously present for several years, it began to disappear so markedly immediately on the commencement of the treatment, that it is impossible to avoid the conclusion that the benefit was due to the high frequency currents.

While speaking of insomnia, I may remark, that with hardly an exception, those patients who have been treated by me, suffering more or less from sleeplessness, have stated that in this respect they have been materially benefited.

Two cases of lupus erythematosus discoides have been under treatment. We all know what a troublesome condition this skin affection is to treat, yet I am able to state that undoubted benefit has taken place in both cases. The following notes of one of the cases have been sent me by Dr. Wyllie Nicol, Assistant Physician to the Glasgow Hospital for Diseases of the Skin: "The patient, a female, aged 32, suffers from well marked lupus erythematosus discoides. It is of three years' duration and affects the face only. In the centre of each cheek is a large patch, and a long narrow one runs down the front of each ear. There is also a small area under the right eye, and several spots are seen on the chin. Since treatment was commenced by the high frequency currents the small area under the eye, and two of those on the chin, have practically disappeared, leaving faint scars. The raised erythematous borders of the large patches on the cheeks have become decidedly flatter and paler, and, as a result, they look smaller and less prominent. Their general redness is less marked, and there is an increase in the white atrophic areas. The patches in front of the ears are, if anything, rather fainter, though at no time was there much erythema there."

Dr. Alexander Thomson, who sent me the other case, wrote to me at the commencement of this month regarding his patient, as follows: "Her condition is now admirable; the scars on the cheeks, bridge of the nose, and the ears have quite disappeared, leaving only a smooth, slightly pink surface in their place. The only parts that are not quite cured, though much improved, are two small circular patches at the margins of the lips. The result has been highly satisfactory."

A case of rodent ulcer, sent me some time ago by Dr. Battersby of Glasgow, has undoubtedly improved under the action of this form of treatment. I am again indebted to Dr. Wyllie Nicol for kindly sending me the following notes of the case: "When the patient, a man aged 58, came under observation, he stated that fully sixteen months previously a small crusted spot appeared on his left temple, and this had gradually increased in size. The ulcer was almost the size of

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a threepenny piece, and presented the features of a typical rodent ulcer. The depressed ulcerating centre, and elevated, rolled, pearly edges were quite characteristic. Permission to excise a small portion for examination was refused. Under treatment, a decided change has taken place in the character of the ulcer, the edges have flattened down to the level of the surrounding skin, and the ulcer has healed in two-thirds of its extent."

Another form of skin disease, namely, acne of the face in a young lady, has also responded in a most gratifying fashion to the influence of the high frequency currents.

It can be readily understood that sufferers from headache of nervous origin find relief from the high frequency currents. One special case I may report. A child, aged 13, born of neurotic parents, while in the country in summer is liveliness itself, but in Glasgow in winter she has up till recently been annoyed with headache. When the question of treating her with high frequency currents was considered, she had been specially troubled; in addition, she had lost appetite, and as a consequence, flesh. She was of a listless, apathetic habit, and was very different from the romping, merry lassie in the country. I was gratified beyond measure to find that the high frequency influence put a stop to the headaches, and that since the treatment was commenced only one attack, and that from stomachic causes, has been experienced. Further, appetite was restored, with an accompanying increase in weight, for the mother complainingly told me "the child's dresses had to be let out a couple of inches." In addition, the whole nervous system seemed to be improved. I happened to be talking of the "D'Arsonval couch" to the gentleman who acts as dentist to the family, and instanced the case to which I have just referred. He was most interested, for he had himself noticed that, whereas the ordinary visits of the child to the dentist's chair had previously ended in pandemonium, lately the child had become much quieter, and had faced up to the terrors of the situation in a way that surprised him. It was to him at the time unaccountable. He accepted my view that the credit must be given to the high frequency currents.

As we are all aware, asthma has many causes and manifestations. I have had under my care for years a clergyman, who very frequently, and especially after preaching, has been troubled with an attack of asthma. In the early morning this had necessitated his sitting up in bed to breathe and to cough. I have always held that his asthma was neurotic in origin—it never annoyed him during his holiday in the country. I suggested to him the propriety of his submitting to the high frequency currents, and I am delighted to be able to state that, except during a recent attack of influenza, when his nervous system was depressed, he has had no asthma

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since he began the treatment in September; nor have the symptoms returned, though he has for months ceased to visit me.

Again, there is no doubt that in patients who suffer from rheumatism in the joints and muscles, great benefit occurs. I have had no experience yet of acute rheumatism, nor of rheumatoid arthritis; I refer rather to cases suffering from stiffness and rheumatic pains in the joints. In the case of a lady aged 60, sent to me by Dr. A. W. Russell, distinct relief was experienced, not only by the use of the "couch," but also by massage of the joints while the electricity was passed through the operator.

Another example of the value of the high frequency currents may be found in the record of a case of chorea which has recently been under my care. The girl, aged 11, had a slight rheumatic attack with high temperatures about a year ago. During the illness a mitral murmur was detected, but rest in bed resulted in its disappearance. Ten months after this attack she suddenly developed chorea, especially of the right arm muscles. I submit specimens of her handwriting taken on different dates, and you may see from these how she benefited by the high frequency treatment. No medicinal remedies were employed, and the child was allowed to run about at her pleasure.

Finally, gentlemen, for I fear I weary you with these many details, let me state that this form of treatment is of great value as a tonic to nervously overstrained men and women. Possibly the improvement in the way of sleep has something to do with the general benefit. There are many cases, too, where there is perhaps nothing specially wrong, and yet the patient is not well, and where the usual run of tonics fails to do good. Instead of the trouble, inconvenience, and expense of a trip up the Mediterranean, let me offer to you the suggestion to try the effect of high frequency currents, and I venture to promise that in most cases you will be agreeably surprised. I have had several cases lately sent to me by my friend, Dr. Crawford Renton, where material benefit has resulted from a course of this form of electricity.

Reviewing my own experience, and allowing as one must do for the element of suggestion which in certain cases at least cannot be ignored, I am convinced that the high frequency currents have a distinct field of value as a curative agency. Their *modus operandi* is at present beyond us, but recognising the influence of the electric force upon the vital processes in the tissues, it is not surprising to find that when applied through the agency of the "condensing-couch" these electric currents do promote more vigorous bodily metabolism and healthy action. As practical physicians we cannot afford to postpone the employment of therapeutic

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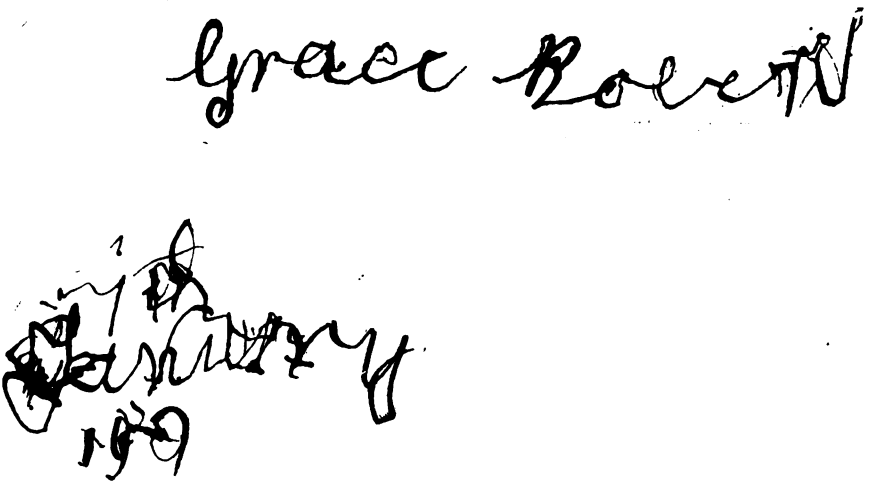
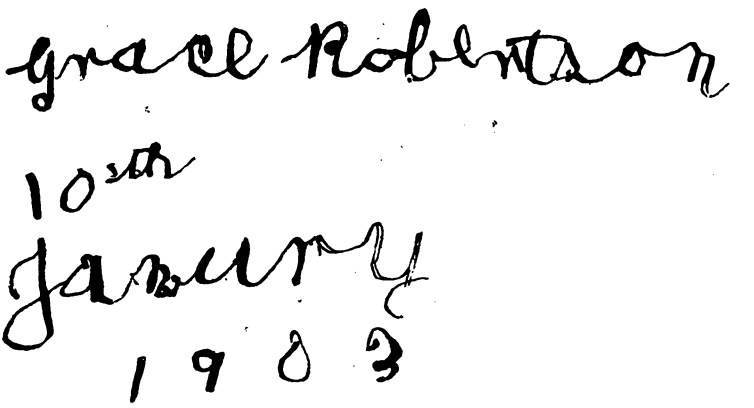
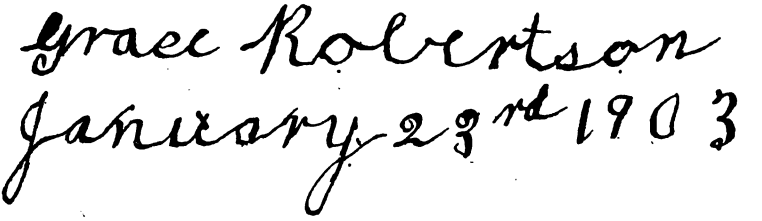


(*The above date is January 7th, 1903.*)

BEFORE TREATMENT.



AFTER THIRD VISIT.



AFTER NINTH VISIT.

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agents until their *rationale* has been fully demonstrated; it is sufficient for our immediate purpose that experience shows us a method to relieve pain and to promote good health. My experience convinces me that in properly selected cases the high frequency currents satisfy these claims, and I venture to think that extended observation will increase the number of those who share my conviction.

The paper was discussed by Drs. BAYNES, SHENTON, BATTEN, MCCLURE and CHISHOLM WILLIAMS.

MARCH 27, 1903.

The twelfth meeting was held at 11, Chandos Street. The President occupied the Chair.

Nineteen members and six visitors were present.

The following members were duly elected :—Drs. Ralph H. Brown, 149, Shaftesbury Avenue, W.C.; J. R. O'Brien, Lowestoft; J. C. Fergusson, Great Malvern; Norman Webster, Guernsey; Charles Heaton, Westgate-on-Sea; Geoffrey Cross, Ramsgate; H. H. Roome, Southsea; G. L. Turnbull, 47, Ladbroke Square, W.; David Lawson, Nordrach-on-Dee, N.B.

Dr. DONALD BAYNES then read the following paper on "Electrolysis and Phoresis" :—

Electrolysis is so intimately bound up with Phoresis that it is difficult, if not impossible, to deal with one to the exclusion of the other. This paper, therefore, includes both phenomena. Whether they are one and the same thing, differing only in degree, or whether phoresis holds a definite, separate, but ancillary position to electrolysis, may well form an item in the discussion that follows the reading of this paper.

The term *cata*phoresis is, I consider, more or less a misleading designation, being simply the name of one of a pair, and can no more be used to describe the pair than to expect to be understood, when talking of twins, to give the name of one to include both. Hence a more generic term is necessary, and several have been suggested, such as electric osmosis, electro-vection, anodal and cathodal diffusion, transmigration of ions, and so on. These terms are both vague and cumbersome. I have adopted the word Phoresis, as suggested and used by Doctors Herdman and Willing of the University of Michigan, in their paper which is published in the JOURNAL OF PHYSICAL THERAPEUTICS. This name is short, definite, and thoroughly descriptive, including both of the pair, viz., anaphoresis and cataphoresis.

I will not discuss the well-known physical and physiological effects of continuous currents on their passage through an electrolyte. An electrolyte is, as we know, a substance that only conducts electricity by itself undergoing decomposition.

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Faraday has shown this peculiarity—that substances which in the solid state are non-conductors, or at any rate bad conductors, but which conduct in a melted condition—only do so by suffering decomposition themselves.

The products of electrical decomposition, "*ions*," appear at the positive pole or anode and are called *anions;* others appear at the negative pole and are called *cations.* The anions are electro-negative, and are repelled by the negative pole, as they are of the same potential as that pole; the cations are electro-positive, and are repelled by the positive pole, being of the same potential as that pole—in accordance with the law, like poles repel, unlike attract.

Electrolysis may be defined as the chemical decomposition of a compound body by electricity. The amount of decomposition depends on the strength of the current and the time during which the current flows, the effects on tissue ranging from simple absorption to cauterisation and even destruction of tissue. Great care must therefore be taken to graduate the strength of the current according to the effect to be produced. These phenomena are chiefly, if not entirely, due to chemical action produced by the electric current, causing the liberation of the acids and alkalies. In this process each pole has its own specific and invariable action and produces its own definite and peculiar results. This chemical process is probably one of the most important properties of the electric current in dealing with human tissue. The human body, for all practical purposes, may be considered as a semifluid mass, the conducting power of which is due to the various salts held in solution. Regarded as an electrolyte one can easily see the important part electrolysis (which means chemical decomposition) and phoresis (the electric transfer of fluids) must have on the human body, each tissue of which has a different resistance to the electric current, nerve and cartilage having two and a half times, bone six times, and skin over a hundred times greater resistance than muscle.

The far-reaching effects of electrolysis on human tissue may be proved by the following experiments, viz., Larat's. He demonstrated that when a charging current of about 25 milliampères is applied by two electrodes, to the arm for instance, for some minutes, and then removed, a current may be detected in the opposite direction of from ½ to 1 milliampere. G. Weiss' experiment is still more convincing. He took a healthy frog and applied a current of a few milliampères to one of its legs, and then put the frog back in the aquarium for a week; at the end of that time the frog's legs were tested to determine their muscular excitability. The contractions of the non-electrified leg gave contractions from ten to twenty times greater than the other. Another experiment he carried out was to expose the legs of a frog to electrolysis; a month after

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he killed the frog and found by a microscopical examination of the legs that the muscles were completely altered. Weiss goes on to say that some of his recent experiments have shown that a single application of five minutes' duration, with a current of 2 milliampères, is enough to produce alterations that may be seen by the microscope several days afterwards.

Electrolysis may be regarded in two aspects, medical and surgical; the former may be described as intrapolar and occurs in any ordinary application of the galvanic battery, and goes no further than simple absorption. The latter is polar, the action taking place at the poles and ranges from simple absorption to the absolute destruction of the tissues. We may now consider the action of the current during the process of electrolysis. Let us take a piece of animal tissue and introduce into it two needles, one attached to the positive pole and the other to the negative pole of a battery. The following phenomena will be noticed: the negative needle will attract the alkalies, the hydrogen, and the base of the salts, dissolving the blood, coagulating the albumen and causing absorption; bubbles of hydrogen may be detected welling up by the side of the needle, caused by the sodium and potassium being set free, uniting with the oxygen and decomposing the water in the tissues. This same chemical action produces caustic soda and potash, and these of their own action destroy the tissue as they would in the ordinary way. On the other hand, the positive needle attracts the acids, the chlorine and the oxygen from the tissues and coagulates the blood. The tissues become oxydised and charred in the same way as if treated with strong acids; at the same time the needle, unless made of platinum or gold, becomes oxydised and undergoes decomposition itself. The scars formed by these two needles are quite distinct and differ considerably in character, that produced by the negative pole being much softer and more pliable; for this reason the negative pole must be used in the treatment of stricture and kindred troubles.

Metallic Electrolysis.—This is more or less a connecting link between electrolysis and phoresis, and goes far to show how closely these two are related. Its own peculiar action partakes of the characteristics both of electrolysis and phoresis. As I have just mentioned, in the case of the two needles inserted into the piece of tissue or muscle, the positive pole (unless made of gold or platinum) in the process of collecting the oxygen, chlorine, hydrochloric, nitric, sulphuric, and phosphoric acids, itself undergoes decomposition. It is quickly attacked by the oxygen and the chlorine set free at this pole and is converted into an oxychloride of iron. If the needle be of copper, zinc, &c., we have an oxychloride of the particular metal of which the needle is formed. Not only is this the case, but this oxychloride is phoretically driven into the tissue

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by the action of the positive pole, being an electro-positive substance. Gautier of Paris was, I believe, the first to bring the great therapeutic value of this fact into prominence. He also found that to produce good therapeutic results on the mucous membrane it was not necessary to puncture them, as he obtained excellent results by simply placing these metals in contact with the mucous membrane, when the oxychloride was formed and phoretically driven inwards. He then had electrodes of suitable shapes for application to the uterus, nasal cavities, throat, &c., made of the metals he required. These electrodes he called soluble electrodes, in contradistinction to those made of gold or platinum, which could be used where these effects are not needed or to be avoided. The value of these applications are very apparent. Instead of spraying or painting a mucous surface with solutions of zinc or copper, &c.—which applied thus have no penetrating power, and only a transient effect—by Gautier's method we not only insure a penetrating and permanent effect, but also the full medicinal value of the metal so introduced, and in addition the knowledge that the electrical application is being carried out under thoroughly antiseptic conditions. This method of Gautier's is the most satisfactory way of dealing with such intractable diseases as ozæna and rhinitis atrophica; also in all kinds of unhealthy ulcerations, discharging cavities, granular eyelids, &c., this method is of the utmost value.

It may not be out of place to briefly allude to ordinary or chemical osmosis before taking up the subject of phoresis or electric osmosis. It is a well known fact that in the case of two saline liquids of different densities, and at the same level, separated one from the other by a porous septum or membrane, an immediate flow takes place from the lighter to the denser, raising the level of the latter above that of the former. This flow may be increased or decreased by the action of the galvanic current owing to its property of producing a flow of fluid in one direction, viz., from the anode to the cathode, therefore if the current be in the same direction as the osmotic flow it will be greatly accelerated, if in the reverse direction it will be retarded. This experiment can be easily shown by means of a U-shaped glass tube divided by a porous or membranous diaphragm at the base, the lighter solution being coloured by cochineal, methylene blue, &c.

Phoresis.—By phoresis we mean the introduction, or passage of fluids, or crystaloids in solution, through a tissue (such as skin or mucous membrane) or porous septum by the agency of the galvanic current. Phoresis includes two distinct and separate phenomena known as anaphoresis and cataphoresis, and is either one or the other as the diffusion takes place from the anode or from the cathode.

It is found by experiment that some drugs are carried into the tissues more rapidly than others, for instance the diffusion

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of alkalies is much more rapid than that of the acids, so also some alkalies are diffused more quickly than others, and the same may be said of the acids. As I have said, phoresis is practically an electrolytic process, as the drug acted upon by this method is broken up into its elements, some going to the negative pole and some to the positive, according as they are electro-negative or electro-positive. This action necessitates a classification of drugs into electro-positive and electro-negative. The following are a few of the drugs or medicaments that come under the class electro-positive, alkalies as a rule: hydrogen, potassium, sodium, copper, zinc, cocaine, gelsemium, jaborandi, ichthyol, iodoform, &c., and of course all these have a strong affinity for the negative pole. Among those classified as electro-negative I may mention the following: the acids, or what takes the place of an acid, oxygen, chlorine, nitrogen, iodine, fluorine, sulphur, and many others. These manifest a strong affinity for the positive pole. When dealing with binary compounds—by these I mean such drugs or medicaments as are composed of two elements, a base and an acid—we find that the base is electro-positive and the acid, or what takes its place, is electro-negative. Take, for example, cocaine hydrochlor., here cocaine is the base, and as stated above in binary compounds, the base is electro-positive and must be applied by or from the positive pole, which repels and transfers it to the negative pole. But suppose instead of cocaine hydrochlor. we are dealing with iodide of potash. In this case the iodine taking the place of an acid is electro-negative, and must be applied by or from the negative pole, which will repel and transfer it to the positive. We may therefore formulate the following rule, which in practice will be found to be fairly accurate, viz., in binary compounds the base of the salt must be introduced by or from the anode, whereas the acids, or what takes the place of the acids, must be introduced by or from the cathode. Now as the dose or quantity of current required in phoretic applications and the duration of each sitting depends to a greater or less extent on the amount of work to be done, each case must be treated on its merits, although always bearing in mind that if too strong currents are used, or if continued too long a time the acids of the body will accumulate to such an extent, at the analectric zone, as to nearly, if not entirely, destroy the drug, and thus neutralise its effect.

The following simple experiments are easily carried out and conclusively prove that electro-negative medicaments having an affinity for the positive pole must be applied by the cathode, which repels and drives them towards the anode; and electro-positive drugs must be applied by the positive pole for a similar reason.

Take a piece of blotting paper, damp it, and then put a

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drop of iodine on the paper. Now insert the terminal of the cord attached to the negative pole of a galvanic battery near the spot of iodine, then insert the positive pole a little farther away from the iodine and turn on the current; you will soon notice the spot of iodine gradually receding from the negative pole until it reaches the positive pole. Or the following: Take a solution of methylene blue and two carbon electrodes covered with absorbent cotton wool; soak these electrodes in the solution and apply to some part of the body, now if a current of from 10 to 15 milliampères be allowed to pass for fifteen to 25 minutes, and the electrodes then be removed we will find that the methylene blue beneath the anode has entered so deeply into the pores of the skin that it cannot be erased by washing, while the stain beneath the cathode is easily removed: this colouring matter in thus leaving the anode and seeking the cathode has passed into the skin and must be electro-positive, and the action is *cataphoric*. But if instead of methylene blue we use a solution of eosin, the permanent stain takes place below the cathode; eosin therefore is electro-negative, and its action is said to be *anaphoric*.

That considerable harm may be done by those using galvanic electricity without sufficient knowledge of the subject, I may mention one or two cases out of several I have seen. A poor lady of comely appearance, who was worried by a few superfluous hair on her chin, had them removed, or rather the attempt to remove them was tried, with the result that the hairs returned, and in addition her chin was scarred by too strong a current being used, and in addition was studded all over with iron stains, the operator having evidently used a steel needle which was connected with the positive pole, and which of course left stains of the oxychloride of iron more or less permanently fixed on her chin.

In another case a child with some paralytic affection was treated with the galvanic current; the operator used an uncovered metal plate to the child's back, the other pole, a sponge electrode, to one foot; these were fastened to the child, and a small "current," as the operator called it, was allowed to flow for some little time; on removing the plate, all concerned in this electrical process were horrified to find that the skin of the back came off as well as the plate.

I could mention many distressing instances of harm done by people whose knowledge of electrical laws, and the effects produced by a galvanic battery, may be summed up thus: "Put one pole on one part of the body and the other on another part and turn on the current." In the practical application of electrolysis (when making the cathode the active electrode) I have found it most successful *inter alia* in the dispersion of fibroids, hydrocele, nævi, moles, warts, cystic goitres, strictures of the various passages, &c.; also in the removal of

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port wine stains or "mothers' marks." In using the positive pole, where we get metallic electrolysis when soluble electrodes are employed, I have had most excellent results in ozæna, rhinitis atrophica, in congested states of the nasal mucous membrane, enlarged tonsils, indolent and unhealthy ulcers, and many uterine diseases where it often may with advantage be used as a substitute for the curette.

Next to electrolysis the most important use of the galvanic current is phoresis, as by this method we have a ready and easy way of introducing various drugs through the unbroken skin into the tissues of the body. I cannot speak too highly of the value of this procedure in the treatment of local troubles, such as various joint affections, neuralgias, &c.; as a means of introducing cocaine, or a combination of cocaine and guaiacol, to produce local anæsthesia I have found this method invaluable. Probably there is nothing prettier than thus producing local anæsthesia. When removing nævi, &c., or treating diseased mucous membranes with soluble electrodes, we have a good manifestation of the uses of electrolysis, metallic electrolysis, and phoresis.

In dentistry, as a local anæsthetic, its powers of reducing the exquisite pain connected with many dental operations is unquestioned. It is, I believe, a common saying among dentists, "that nothing resents undue familiarity more quickly than an inflamed pulp." Well, nothing more quickly removes the extreme sensitiveness of this inflamed pulp than its phoretic cocainisation. While on the subject of teeth, I may mention another important use of phoresis, namely, its powers of bleaching discoloured teeth by its phoretic action with peroxide of hydrogen.

In neuralgia, neuritis, and some other painful affections, the relief of pain is quickly accomplished. But it is in cases of rheumatoid arthritis, arthritis deformans, gout, rheumatic joints, and adenomatous goitres, and allied affections, that I have found phoresis so invaluable.

I am now treating a case of adenomatous goitre; the swelling on one side has quite disappeared, and on the other it is only one quarter of the original size. I have had excellent results in gouty and rheumatic affections of the joints, the nodosities and thickenings being reduced and the normal condition of the joints restored. I have found that in rheumatoid arthritis, when the treatment has been commenced before absolute destruction of the joints has taken place, a cure may be confidently anticipated. The results I have obtained in some of these cases seem little less than marvellous. One case I remember that was going from bad to worse; when I first saw the patient she had to be lifted from a couch to her bed, and from the bed to a couch or chair, after one month's treatment was able to walk some distance, and

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in less than three months she was taking long walks and rowing. In this case all the joints were affected. If time permitted I would have given several cases and in greater detail.

Dr. McCLURE and the PRESIDENT discussed the paper.

Dr. T. A. CODD then read a paper on "The Electric Series Bath":—

In presenting this paper to you I feel an apology is due for the introduction of much that to an audience like yourselves is very trite and commonplace, but which, nevertheless, requires to be impressed upon the general body of the profession, who, though they may be users of electrotherapeutical measures, are still far from realising many important principles.

It may not be uninteresting, too, if there were presented an indication of the lines of my mental evolution as a worker in this field—an isolated unit, until the formation of this Society.

It is my object in this paper to express my conviction that for electrical treatment large electrodes and large currents give better results than the small round discs that are still employed, and that a bath in which as much surface as possible is immersed, and yet the body is in series with the milliamperemeter circuit, that such an arrangement is in some respects preferable to the ordinary complete immersion bath.

Treatment by electricity, and especially by the constant current, often fails by reason of faulty attention to technique and especially to insufficient dosage. The current given is often paltry and utterly inadequate, and is frequently limited by the nature of the source of energy, especially if it happens to be a portable battery, which in most of its forms does not give out sufficient current.

There is also the further factor that when the ever popular small electrodes on handles are used, the current density is so great that a current of 15 or 20 milliampères becomes very painful and almost unbearable, and often severe and intractable burns are produced.

Current density bears an inverse ratio to the surface of the body in contact with the electrode, and it is density, not current, that determines the painful effects. If a current flowing through an electrode of four square centimetres area produced unbearable pain of liminal intensity (that is, the least amount of pain that could not be endured), then the same current flowing through an electrode of sixteen square centimetres would produce pain that could easily be borne, perhaps about half the pain that was produced in the former case. So, briefly, square the area and you halve the pain. Or with a constant pain element, the current traversing the small electrode would be half that producing the same pain when the larger electrode was used. That is, to double the current you require to square the area of your electrode to cause the same pain. The current that first produces a sensation with

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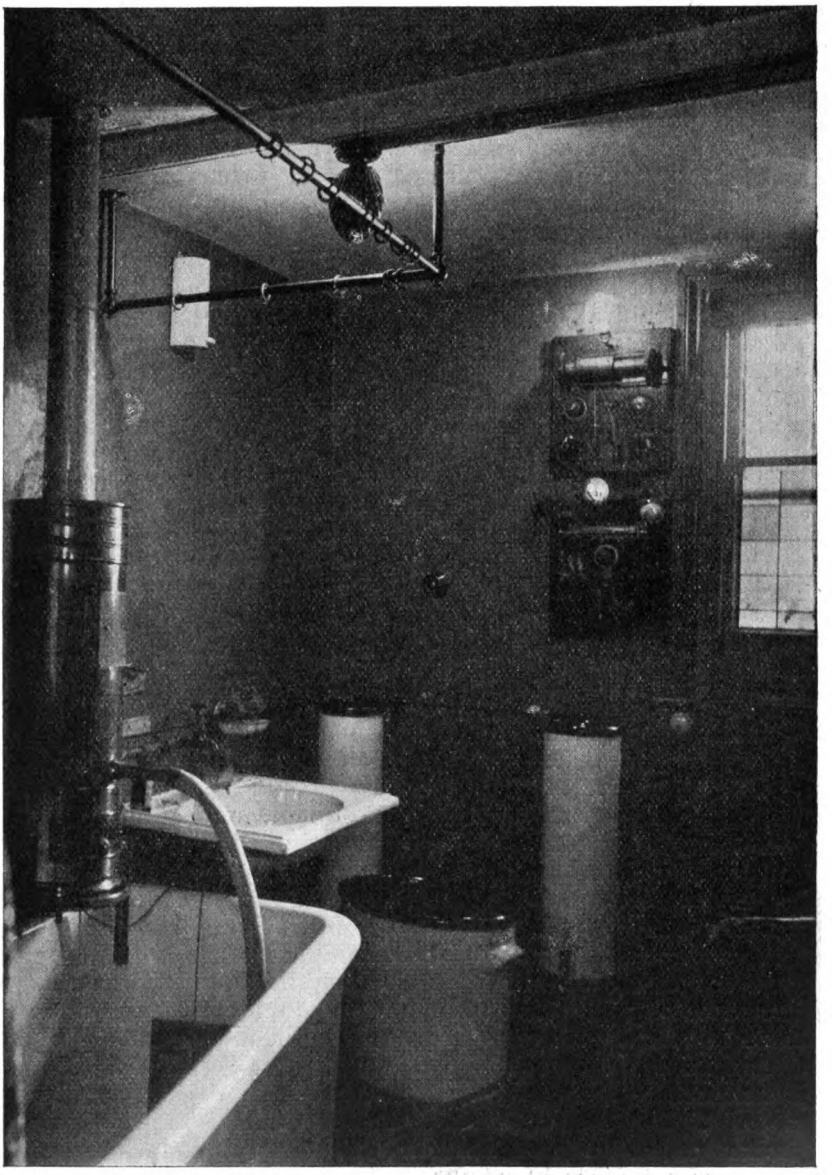

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the 4 sq. cm. electrode would require to be nearly doubled to produce liminal sensation with a 16 sq. cm. electrode. So that the relation is somewhat similar to Weber's law within certain limits.

Diseased areas are generally large. To influence the morbid process the whole area should be traversed by the current. This can be done in two ways. Firstly, by applying to the adjacent portions of surface a small electrode (or a roller electrode), which is moved successively over the small areas which make up the whole surface affected. In the former method the bearable current is far smaller, and the duration of exposure of each sectional area much shorter, and the frequent variation of current in each segment is another painful factor that is not present in the second method. There is farther the undoubted clinical fact that large electrode and large current, with almost complete absence of pain, invariably give far better results in my hands than the labile or gliding-electrode method.

I deprecate, therefore, the labile method and the use for treatment (as distinguished from diagnosis) of the small disc electrode, and especially of the obsolete brass cylinders which still find favour in some quarters; and advocate the general use of electrodes with as large a surface as possible. The structure of the electrode is a matter of great importance. There should be in contact with the skin a layer of appreciable thickness of a substance with a conductivity as near as possible to that of the well-moistened skin. A metal surface, either naked or covered by a thin layer of moistened stockinette, wash-leather or lint, readily produces severe pain and burns with even small currents. Carbon, either in discs or in tightly packed fragments, is better, but still has the same effects in a lesser degree. The electrode should be flexible and thoroughly adapt itself to the whole surface, maintaining good contact. The padding should be uniform, presenting the same thickness throughout from metal to surface, and should be very absorbent. It should be easily capable of being replaced when soiled.

I do not think any of these conditions are realised by the electrodes of commerce. I have therefore constructed electrodes as follows. An oblong of stout copper gauze is soldered to a stout brass wire about 4 inches long, carrying a terminal, the wire being covered with a rubber tube. This is hemmed round the edges with a piece of tape or similar material. It is then attached to a piece of American cloth or similar waterproof material, slightly larger than the area of the gauze. A piece of compressed peat moss dressing is then cut the same size as the gauze and enclosed in a cotton stockinette bag, which in turn is stitched to the tape hem. It can easily be cut off when soiled and another similar bag

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containing peat moss stitched on. While this is not so readily done as with the celluloid ring electrodes it nevertheless presents no difficulties. The compressed peat moss should be about half the thickness usually sold, otherwise it becomes too thick when swollen with water. Water is a much better moistening fluid than saline solutions (apart from its less corrosive action on the metal) because its conductivity more closely approaches that of the moistened skin. In treatment of the limbs a local bath is an ideal electrode, adapting itself to every curvature of the surface, and the current entering the body in a fairly uniform manner over a large surface area. By immersing the affected limb in one cell, that cell becomes the active electrode, and by immersing the other limbs in other cells they jointly become the indifferent electrode, and a larger or smaller amount of current can be borne with ease according to the efficiency or otherwise of the cell used. For some purposes (*e.g.*, in small children) another useful method of treating limbs is by a bandage electrode, made in the same way as described for a large electrode, but long and narrow so as to be wrapped round the limb several times.

In many cases, especially where the disease is not definitely local, it is advisable to apply the current to the whole body. This is generally done by the ordinary or "Shunt" bath. The patient lies immersed in a bath, with one electrode behind his shoulder and the other at his feet, and a movable electrode is sometimes used to direct the current to a particular part. In this arrangement the greater part of the current passes through the water while a Shunt circuit passes through the patient's body, the current of which is indeterminate, estimated by different observers, as a varying fraction of the whole. Dr. Hedley puts it at $\frac{1}{4}$, others say $\frac{1}{6}$, or $\frac{1}{8}$, or less. It varies with the bulk of the patient, the height and temperature of the water. It is thus impossible to estimate the exact current the patient is getting, and the only alternative is to use a fixed temperature and height of water, and then the readings of the galvanometer will give relative though not absolute accuracy. The absence of absolute accuracy is no excuse for discarding a galvanometer, even with the Shunt bath, which should on no account be dispensed with.

The advantages of the Shunt bath are: (1) the whole body except the head comes under the influence of the current; (2) owing to the great surfaces exposed, large currents can easily be borne; (3) the whole immersed surface receives gentle pleasant stimulation; (4) the patient is reclining in a comfortable position.

The disadvantages are: (1) accurate measurement is impracticable; (2) the installation is difficult in many houses. It is practically necessary to have an earthenware bath, and

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most houses are fitted with iron baths, so that it means a new bath. An oak tub can be used, but has disadvantages; and iron baths, however well enamelled, are not to be recommended.

If the current from the main is used, which is very advisable, the bath must be effectually insulated from earth. All these difficulties tend to deter medical men from installing them in their own chambers, and so the treatment has largely drifted into the hands of quacks, who have done it discredit.

To measure the current exactly, Gärtner proposed to insert a diaphragm to envelop the body closely and divide the bath into two parts, making two huge electrodes; but this is scarcely practicable and has not been seriously attempted.

To obviate these difficulties, and at the same time provide an efficient apparatus for general electrification, I constructed in May, 1900, an apparatus which I call a "Series" bath. It consists of a cell for each arm, arranged so that the water nearly reaches the axilla. A larger cell is for the reception of the legs, the water reaching up to within three inches of the popliteal flexure. Each of the three is drilled to receive a terminal, which is connected to a plate-electrode at the bottom. These are mounted upon a platform in such a way that the patient sits in a comfortable position with an arm in each arm bath, and both legs in the larger cell, insulated from earth. On connecting up the terminals, the current flows from the feet to the arms, or *vice versâ*, and so traverses all the body, except the head, as in the Shunt bath. The areas of entrance and departure of current are very large; not so large as in the Shunt bath, but still large enough to enable a patient to readily bear 80 milliampères, and the whole of the current traverses the body, and the galvanometer reading is an exact measurement of the dose he is receiving.

I find that the current is much more felt in the arms than the legs, even when the leg bath is but half filled, so that there is no need to immerse the thighs as well, which could be done if the patient stood up and had a higher bath, though at some inconvenience; but as a matter of fact it is not necessary.

With this apparatus 60 milliampères is easily borne, and in many cases 80. I have often taken 80 myself quite comfortably and even more, but beyond this limit I am conscious of some precordial discomfort and anxiety. Some subjects will take 120 milliampères "without turning a hair." These results compare well with the Shunt bath. With the latter 300 milliampères is about the maximum, and here only $\frac{1}{4}$, $\frac{1}{6}$ or $\frac{1}{8}$ of the current goes through the patient. In the Series bath, 60, 80 or more is used, and the entire current passes through the patient.

There is one possible disadvantage. The whole immersed

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surfaces undergo cutaneous stimulation, but the skin of the trunk and thighs do not participate as they do in the Shunt bath. Then the erect posture is perhaps not quite so easy as the reclining.

I have recently modified the shape of the cells and platform and have added waste taps to the cells. The new pattern is more comfortable but does not differ in principle.

I have also an ordinary porcelain Shunt bath in my house (a part of which is seen in the plate) and I have compared the two methods. For local affections the Series bath is more useful. For general affections there is probably not much difference in effect, but the much greater ease in administration and accuracy in dosage has led to the much more frequent use of the Series bath.

With regard to indications for its use, I may say briefly that in myalgia, neuralgia (especially sciatica) and chronic rheumatic pains I have found it of great benefit in cases intractable to other treatment, either with Series bath alone or combined with radiant energy baths ; and ordinary cases that would probably yield to drugs are often cured at one sitting, or at any rate much more rapidly than by drugs.

Paralytic affections, especially atrophic forms, yield to the Series bath much more readily than to the method of picking out motor points seriatim, and there is a great saving of labour and time.

Hypochondriasis, neurasthenia and other psychophysical states are sometimes cured, sometimes not, but are in all cases relieved, much more so than by any drug treatment; and in many cases it acts as a useful substitute for a voyage, or other similar forms of moral, physical, or climatic treatment, which are so often inaccessible to patients for various reasons. Since I made my original baths a very useful form of Series bath has been made by Schnée, but here the water only reaches up to the elbow, while in mine it reaches up to the axilla, and so there is more surface exposed and, ergo, larger current can be tolerated. The lower limbs also get more immersion in my form than in Schnée's, but this, for the reason stated above, is less important.

As to details. To determine the direction of current in general galvanisation, it is best to consider the upper electrode as the active one, the vital organs coming within its zone of influence. For stimulating I give ascending, for depressing I give descending current. For local affections, the nearest limb to the affected area should have the specific polarity required given to its bath : *e.g.*, for unilateral sciatica, the affected leg only should be immersed in a well filled leg bath connected to the anode, the arms connected to the kathode. For pain about the trunk a large pad electrode, say 14 inches by 8 inches, should be applied and connected with the anode,

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while either the arms or the legs should be immersed in their appropriate bath and connected with the kathode. I have also administered induced current and combined current by this method with success.

The advantages of not being dependent upon a lay institution is obvious, and is appreciated by patients, especially those who come from a distance, and the Series bath could easily be fitted in the house of any general practitioner, which could not be said of the Shunt bath.

To sum up, then, the advantages claimed for the Series bath :—(1) It is easily installed, takes up but little room, can be taken to patients' houses ; (2) it is easily managed, requires very little water to fill, very little undressing required ; (3) dosage is accurate, large effectual current well borne ; (4) practically it is a success.

As to how far the moral and how far the physical element predominates in diseases characterised by subjective symptoms it is not easy to speak dogmatically, but the close relation between *dose* and *therapeutic value* has impressed me very much, and convinced me that the curative influence is at any rate largely physical, which laboratory experiments upon electrotonus, currents of action, migration of ions, and similar phenomena render very probable.

The paper was discussed by Dr. FERGUSSON, Mr. HALL EDWARDS, and the PRESIDENT.

Dr. G. B. BATTEN then read his paper on "A System of Heat, Light, X-ray and Electro-Therapeutics worked from the Alternating Mains," illustrated by many pieces of apparatus of a most interesting description :—

I have worked now for some years from the alternating electric light mains, and having six months ago had an electrical room for therapeutic purposes fitted up at my house, I thought it might interest some of you to know how the difficulties in connection with the alternating current had been overcome by me, and wish to show you one or two comparatively new instruments invented by myself with the aid of my friend, Mr. Geo. Sutton.

The current at my house is supplied from the County of London and Brush Provincial Electric Lighting Company, and is an alternating current of 200 volts at a periodicity of 50 per second, and I have a separate meter to measure the current in this electrotherapeutic room.

I may mention that I heat the room itself as required by an electric Apollo stove with four incandescent heat lamps ; this burns exactly one unit an hour, and is very convenient.

I will divide my subject into four main divisions as suggested by the rather long title to my paper. Treatment by :

(1) Heat.

(2) Light.

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(3) Röntgen or X-rays.
(4) Electrical methods proper.

I divide each of these into subdivisions (as shown on table printed at the end) which I will mention in order, with method of using the current, and some of the complaints that can be treated by each modality of physical radiation. I am enabled to utilise the alternating current for many of these methods by the help of three special instruments: (1) Plug-in, step-down transformer; (2) my rectifier for charging accumulators; and (3) my rectifying interrupter.

(1) Heat.

(*a*) *Electro-Cautery.*—I use the ordinary electro-cautery from either 4 to 6 volts from accumulators charged from the alternating current by means of this rectifier, which I have already on a former occasion fully explained to you, and a description of which has been published in our Journal.

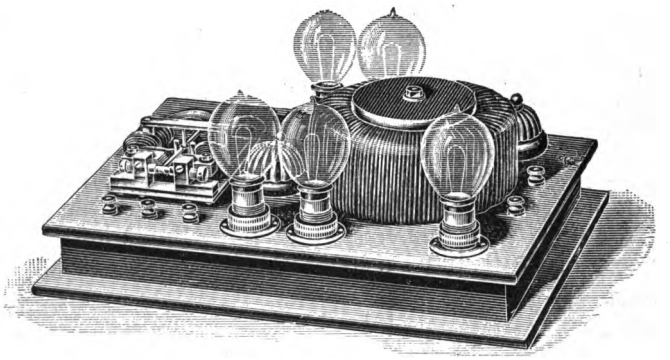

Fig. 1.

More often I use the electro-cautery from this step-down transformer direct from the mains; a voltage of 4 to 6 is best. The electro-cautery, is as you know, very useful in treatment of many nasal complaints—in granular pharyngitis, for nævi, moles, warts, &c. Warts and small moles can be removed in one sitting by freezing by ethyl chloride, and then burning off with electro-cautery; wait until all the liquid ethyl chloride has evaporated before turning the current on or it will catch fire. A practical point is to burn fairly deeply and to wipe off the wart, or tell the patient to do so at the end of twenty-four or thirty-six hours, not longer. A line of separation, due to the burn, occurs I believe in the prickle cell layer of the skin, and if the wart is taken off while this separation blister lasts it is cured; otherwise it may harden down and commence to grow again.

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(*b*) Heat from wires heated by electric current as in the Greville system; personally I do not use this, as I prefer next two methods.

(*c*) Heat from incandescent electric lamps, either those used by Dowsing or ordinary 200 volt, 50 candle power lamps used of course directly off the mains or, if desired, at a less degree of incandescence through the transformer at a lower voltage. I have this sort of bath fitted with these lamps; this can be used either with patient sitting on a chair or lying on a couch, and I have three special shaped radiators which are movable.

(*d*) Heat (and light too) from arc lamps. I use an ordinary angold alternating arc lamp, but instead of using it enclosed in glass, I project the rays by a small parabolic mirror on to whatever part of the patient is desired; this is better than using any condensing lens, for the lens intercepts a great number of the heat and violet light rays.

This arc lamp is worked at 100 volts from the 200 volt alternating current by means of the usual balancing coil sold for this purpose; the arc burns very steadily and with very little noise, mine takes 3·6 ampères off the 200 volt alternating current or 7 ampères at 100 volts.

These various forms of heat baths are useful in sprains, myalgias, neuralgias, neuritis, as in sciatica, lumbago, in arthritis, and contractures due to rheumatism or other like forms of intoxications, and also of course used to produce, when desired, sweating in renal diseases. I find the arc light much the most pain-relieving of these methods and the least enervating or tiring, but I usually use the arc and incandescent lamps combined.

(2) LIGHT.

(*a*) From carbon arc lamps as in Finsen treatment, and the various modifications of this. Personally I have not used those, preferring

(*b*) The blue arc lamps, with iron electrodes, such as the dermo, which, however, will not work direct off the alternating current, even when rectified, or the Miller lamp, which you all know, and which I work from the alternating current by a step-up transformer in oil with a condenser in parallel. This I have found good but rather noisy, though less noisy if rather a smaller condenser than usual is used, and I can get this to work well with 1·5 ampères from the main.

Recently, however, I have had a new iron electrode lamp made for me by Mr. Cossor. It is an iron electrode lamp with electrodes in a comparatively low vacuum and I work it with only 1 to 2 ampères from the mains, then through a step-up transformer in oil, giving 2,000 to 10,000 volts in secondary.

It is quite silent, as you observe, and is also rich in rays

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that cause fluorescence. I have also had made one with a quartz window in it, which allows much more of the ultra-violet rays to get through. My friend and co-member, Mr. Clark, finds this lamp works well off his static machine.

I daresay some of you have read that nitroxo-dimethyl-aniline is a substance that Prof. Wood says when used in connection with cobalt glass allows only the ultra-violet rays to pass, but I have not yet been able to obtain any, nor to find out in what it is dissolved, as water and alcohol are opaque to ultra-violet rays.

As you know, among the diseases treated by these various forms of light radiations are lupus and lupus erythematosus, rodent ulcer, epithelioma, some superficial carcinomas, and some chronic indurations of the skin, also so-called port wine stains or nævi.

One disadvantage of all these forms of light treatment is that the part to be treated must be rendered anæmic, usually by pressure, or as done more recently on mucous membranes by adrenalin.

(3) Röntgen or X-rays.

For production of these I have a 14-inch induction coil, worked by means of this comparatively new rectifying interrupter at any desired voltage, through this step-down plug-in transformer directly supplied from 200-volt alternating mains. It works well, as you see, from 50 volts alternating and 25 volts rectified at about 5 ampères. I have not yet succeeded in making it work well at 100 periods per second, but it has worked well for a year now at 50 periods per second at my house, and it works here at 60 periods, and will, I believe, work all right up to 75 or 80 periods. I understand that the periodicities in most of the lighting circuits are coming down to 50, so this instrument will then be useful wherever the alternating current is supplied. This interrupter is driven by 8 to 10 volts alternating, and uses less than $\frac{1}{10}$ of an ampère.

For therapeutic purposes, and for all prolonged uses of X-rays as screen work it is a tremendous boon, as one can use X-rays all day direct from the mains without any worry of accumulators running out, or any of the troubles one gets with the ordinary mercury or electrolytic brakes.

This rectifying interrupter is practically a relay worked by the alternating current, and this long aluminium prolongation or arm carries a copper wire at its end; this moves vertically, exactly synchronously with the alternations of the current, and is arranged to dip into mercury on its downward excursion, and of course comes out of mercury on its upward excursion, thus making contact only during one phase of the alternating current, and thus allows a succession of similar

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pulsations of current to go through the coil; in this way it acts as a rectifier and an interrupter in one.

I use a Shenton couch, and for diagnostic purposes Dean's Osmo tube usually under the couch, and for therapeutic purposes either the same tube above the couch, screening with a tea lead and cotton wool screen, or one of Cossor's therapeutic tubes.

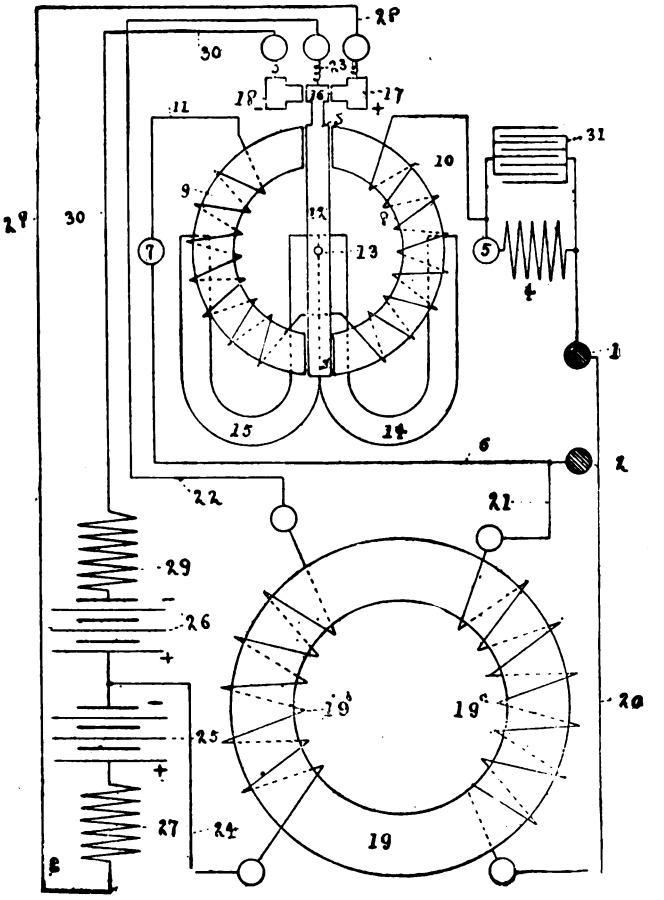

FIG. 2.

I find for all X-ray therapeutic purposes, and for all ordinary diagnostic purposes the coil worked with this interrupter is admirable, but for very rapid X-ray photographic work the interruptions are too rapid, and I use the current from accumulators (of which I have twenty or more cells) which I keep charged by means of my rectifier.

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Until recently when using the constant accumulator current I used the ordinary motor mercury brake either worked from the accumulators or through the rectifier from alternating mains; these motor breaks, however, take usually about 3 ampères at 12 volts, *i.e.*, take 36 watts, and they are noisy.

Quite recently Mr. Sutton and I have invented this new form of vibrating break or interrupter, rather like our alternating rectifier brake, or an ordinary electric trembler bell. This works from 6 volts constant current and requires only $\frac{1}{20}$ of an ampère at 6 volts to drive it, or $\frac{3}{10}$ of a watt. Or it can be worked through a lamp from constant current mains. By means of this spring and pressure screw one can regulate its speed from about once a second to 30 or 40 per second. As you will see, it is extremely simple in construction.

I hope it will soon be made and placed on the market, as many will find it of service to them.

Of course this will not work off the alternating current, but it will work driven by the rectified current, the coil being worked from accumulators.

Being able to vary the pace of this interrupter so easily enables one, for instance, to focus with the screen with rapid interruptions, and then alter to slower interruptions for photography, and this can be done almost instantly and with no trouble at all. The electro-magnets are placed behind the pivot of the arm, so that the acceleration due to their action, which is much greater than that of gravity, pulls the conductor out of the mercury so that a very sudden break in the current is obtained.

Among the diseases that we can use X-rays successfully for are lupus, rodent ulcer, epithelioma, some carcinomas, especially carcinomatous ulcerations and superficial nodules of carcinoma, especially recurrent nodules. I will read notes of one such case which I have recently treated very successfully.

M. M., married lady, at 56 still menstruates regularly, has had ten children, eight now grown up; had her left breast and axillary glands removed by Mr. Jonathan Hutchinson, jun., two years ago last November, since which time she has been under my care and has had six recurrent nodules removed by Mr. Hutchinson, the last one being in September, 1902. Another nodule appearing in November I determined to X-ray it instead. Between December 5 and December 19 I X-rayed it with a Dean's tube, medium hardness with anticathode about six inches from chest, and surrounding parts protected by a lead and cotton wool shield, still the whole of the area where cancer had been was exposed. I X-rayed it for ten minutes a time, eight times in fifteen days; after the second exposure the pain she had been experiencing previously got less and soon disappeared; then I waited thirteen days, and as no dermatitis appeared I X-rayed it again on January 1, 3 and

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7, for fifteen minutes each time; as definite redness then showed itself I stopped the treatment. By January 16 it was decidedly red, as these photos show. By the 21st there was superficial ulceration over a patch the size of a crown piece where her stays had pressed, and another small one where the nodule had been; this nodule, which had been the size of a lentil, had now disappeared.

The ulceration and dermatitis, which was rather painful, had quite healed by February 12, and the part treated was in a very quiet healthy-looking condition. All the scars now seem less adherent, and a thickening on a partly resected rib, which Mr. Hutchinson in October thought might be carcinomatous, had flattened down and disappeared. I X-rayed her again as a preventive measure on March 10 and 12 for twelve and a half minutes each time, and after a few days a slight redness in the centre and bronzing at the circumference appeared. Now although X-rays have undoubtedly caused this nodule of carcinoma to disappear, some of you may ask, as I did at a recent meeting of the Röntgen Society, whether excision would not have been the easier treatment for the patient. I think it would, but nevertheless I should again use the X-rays on a similar case, for if they can set up such a reaction as to cause this actual nodule, large enough to be felt, to disappear, surely this same reaction will cause the disappearance of any commencing nodules which are still too small to be perceived, and so tend to prevent recurrence. Occasional X-raying should keep this action up.

It will be convenient here to mention one explanation of how X-rays act. Dr. Mayou and others have proved by microscopic sections that when the human tissues re-act to X-ray influence there is always marked leucocytosis set up in that part, that the leucocytes attack diseased epithelial elements first, and then if treatment is prolonged they attack the healthy epithelial elements and cause ulceration of the skin, moreover that he has never succeeded in causing marked local leucocytosis deeper than half an inch. However, we know that where there is any inflammatory condition locally there is always some general increase of leucocytes, and it may be this general mild leucocytosis that accounts for the disappearance of more internally placed carcinomas, of which some cases have undoubtedly been recorded.

We want to arrange our X-ray treatment therefore to cause sufficient leucocytosis to eat up the malignant epithelium, and stop short of attacking the healthy epithelium of the skin and other parts, and by experience and care one can certainly do this.

In this connection I may say that in rodent ulcers so treated, all the diseased epithelial nodules disappear and are replaced by healthy fibrous tissues, as one may see by Dr.

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Mayou's micro-photographs in the Röntgen Archives. If I myself were unfortunate enough to get epithelioma, say of the lip, would I have it excised or would I X-ray it? Certainly I would X-ray it first, and if that did not do, I should have it excised and then should X-ray the parts afterwards. The same with lupus and rodent ulcer—I should certainly X-ray them first.

If I got a carcinomatous tumour I should *first* have it excised thoroughly, and if I survived I should X-ray the part afterwards and continue doing so from time to time, so convinced am I of their local beneficial action.

I should like to mention that I saw last week a boy whose hand and wrist I treated twenty-two months ago for extensive lupus of many years' standing. I exposed this case twenty-three times to X-rays and it healed in six weeks, and now there is no trace of lupus, and hardly any scar remaining. Some cases of sarcomas successfully treated by X-rays have been reported, but of these I have had no personal experience.

Trachoma and pannus, most troublesome complaints and most intractable to ordinary treatments, yield in a surprising manner to X-ray treatment, as first shown by Dr. Mayou, and also by Dr. Walsh, who treated one eye only by X-rays on several patients, continuing ordinary treatments to other eye, and it was the X-rayed eye only that got well.

X-rays have also been found useful in hypertrichosis, and in some chronic eczemas and psoriasis, and to cause the hairs to fall out in ringworm, but I find healthy hairs fall out more easily than the diseased hairs—it naturally would be so with that wretched ringworm.

Under this heading one should also mention Becquerel rays and radium rays, but the use of these, although possible, is at present hardly practicable, for radium costs, I understand, £200 a gramme; perhaps however, some day we shall be able to use radium plasters to cure rodent ulcer, &c.

We now come to treatment by electric methods proper.

(*a*) *Static Electricity.*—A static machine is very conveniently driven by an alternating current motor which is very compact and almost noiseless, as our worthy Treasurer has well proved.

With static electricity of course a variety of complaints, especially those in which pain is a prominent symptom, are well treated.

(*b*) *Continuous Current.*—I think accumulators might be used more for production of constant current for medical purposes than they have been; the ordinary dry cell or little constant current batteries so often get out of order. It is so easy to take as little or as much current as we want from accumulators, and nearly all of us have accumulators now for some purpose or another. The best accumulators I know

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are the ones I use for my motor car, namely, Van Raden's wovenglass accumulators, two cells of which of 40 ampère hour capacity weigh only 19 lbs. fully charged.

The continuous current having an electrolytical or chemical action acts well wherever it is required to increase the nutrition of any part of a patient; for instance, it is of great use as a stimulant to the hair growth as in alopecia, and on the other hand of course it is useful to remove obstinate hairs by electrolysis.

Both constant current, and the next,

(*c*) Alternating or sinusoidal currents, are especially useful in baths, either the ordinary bi-polar immersion baths, or I believe better still in what may be called the multiple celled or Series bath, as I believe originally used by Dr. Codd, who has shown to us here to-night, that by using different vessels containing water and sodium chloride or other salts for the hands, feet, and body, we are enabled to send an easily and accurately measured current in any desired direction and concentrated on any desired part. In constant and alternating current baths we have splendid and powerful means of treatment, especially of such general diseases as gout, rheumatism, rheumatoid arthritis, and the varied joint and other troubles, and many forms of neuritis associated with those diseases; the continuous current being perhaps more useful for the arthritis and atrophic symptoms and the sinusoidal for neuritic symptoms.

In fact at Buxton, Bath, Harrogate, Aix, &c., the mineral water treatment is now largely augmented by these baths. Dr. Armstrong tells me they greatly hasten and increase the elimination from the body of uric acid and other such poisons which spa treatment seems to throw from the joints, &c., into the blood. In fact, with the addition of the electric bath treatment patients do not have now to wait until afterwards to feel the benefit of spa treatment, which is a great gain in these busy times.

The alternating current is very conveniently used from the mains by means of a step-down adjustable transformer and a variable resistance, such as a graphite resistance. It should of course be measured. It is safer to put in a full voltage, low candle power lamp in series with primary of transformer to cut down the current to within quite safe limits.

Before leaving alternating currents mention must now be made of the polyphase currents which Dr. Geo. Herschell so ably demonstrated to us at the last meeting.

(*d*) I will not linger over faradic currents except to say that faradic coils should be made with plenty of turns in primary and secondary too.

(*e*) *Rectified currents.*—Last year I suggested that these

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might be used medicinally, and I have here a small model of my rectifier suitable for this purpose.

The alternating current is supplied to this simple straight step-down transformer, and from the secondary one can take it by means of these little holes and this plug at any desired voltage into this rectifier movement, which rectifies it and distributes + charges to one side and − charges to the other, as in my ordinary rectifier; the rectifier being driven through this lamp direct from the mains—in fact the same scheme as in my other rectifier. This medical rectifier requires no condenser, and works without trouble or bother.

I have here diagrammatic representations of the various kinds of currents—the continuous, the faradic, the alternating, and the rectified. This rectifier splits this double curve of the alternating into two sets of curves—all the top curves through one circuit and the lower through another circuit. The rectified current is therefore an undirectional pulsating interrupted current; and thus it combines in itself many of the qualities of the continuous, the alternating and the faradic.

It is unidirectional like the continuous current, and therefore has similar chemical, electrolytic properties; this is shown by its chemical action on this pole-finding paper. It therefore stimulates the nutrition of the parts it passes through.

It is pulsating, like the alternating current, there being a regular rise and fall of E.M.F. as shown by this curve, and it has the stimulating and nerve-soothing effects of an alternating current.

It is interrupted like a faradic current, and has the muscle-stimulating effects of the faradic, but unlike the faradic is not broken at its highest potential, and therefore the painful shock is comparatively little.

This rectifier can be used in several ways, either side can be used directly or by means of bi-polar or multiple coil bath, and two persons can be so treated off the same machine at the same time; one from each side.

Or we can use it in a tri-polar way; for instance, the plus terminal may be taken from a footbath or other electrode from the feet, the negative electrode from the hands, and both may be carried to a common electrode placed on the spine; plus impulses will then travel from the feet to the spine, and negative from the hands to the spine; or what is the same thing, plus impulses will pass from feet to the spine, immediately followed by plus impulses from spine to the hands, each being unidirectional. And of course these currents can be applied in any desired direction from any part of the patient to any other part, and it can and should be measured.

I have found this current especially useful in the later stages of sciatica, to help in getting the flabby muscles and nerves into healthy action and so expedite recovery. The

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rectified current can be used for any complaints in which the continuous, sinusoidal or faradic currents are useful. The passage of the current is quite agreeable to the patient.

Lastly, I must mention oscillating currents, or high frequency as they are commonly called. I made a Tesla coil myself as long ago as 1895, and used it in a few cases of painful joints, but I did not then persevere in this treatment, although I thought it should be useful.

I now use a Dean-Oudin resonator, and I have removed the glass cover for spark gap and simply enclosed the Leyden jars and spark gap in a felt-lined receptacle which is simply the pedestal of the table covered in, and I have now no trouble with spark gap.

I used to use a motor interrupter for the coil, and then a water-cooled electrolytic break, and I did try simply a step up alternating current transformer which, however, was not satisfactory, due to arcing across the spark gap.

I have discarded all these now, and always work my high frequency from a nine-inch coil with primary and secondary in castor oil, and this rectifying interrupter, straight off the alternating mains, of course transforming down the voltage to about 40 or 60 volts first. This interrupter works splendidly for high frequency, giving one a very steady long effluve.

Personally, the method of using the high frequency, which I find most useful, is to use the condenser couch from the primary turns of the resonator, and if one wishes to apply the current locally, I put one end of primary on to the conductor under cushions of the couch, or on to handles held by the patient. I apply current from the other primary terminal through a glass electrode either filled with acidulated water, or I prefer an *iron* electrode in a vacuum, which I have suggested and which has been made for me, and can be made of any desired shape. By using these one gets the therapeutic effects of blue and ultra-violet light as well as of the high frequency current.

By employing the current from the primary of the resonator in this way, one gets much more ampèrage or milliampèrage, up to 800 milliampères, than by using effluve or current from top of secondary of resonator. For instance, for sciatica and other rheumatic neuritis or arthritis, I place the patient on the condenser-couch with one pole of primary to couch and the other applied by this glass electrode up and down the sciatic nerve, and at the same time I keep patient hot, all except his head, by means of incandescent electric lamps, and also apply a beam from the photo arc lamp to the sciatic region as shown in this photo, and I find this treatment very efficacious.

I append a list of complaints in which the high frequency current has really been found useful. You will see that

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though the list is long and not complete, I cannot include carcinoma at present; and I think we must all regret that a member of our profession should have been so misguided as to give any countenance to the recent booming in the lay press of the at present quite unproved benefit of high frequency in cancer. We should all do our utmost to prevent the booming and consequent certain misuse of this very powerful and useful means of treatment, or discredit will surely overtake these methods, and much useful work will thereby be prevented.

In conclusion, I should like to ask how can we explain the undoubted effects of heat, light, X-ray, and electric radiations? Are they bactericidal? Probably violet light is directly so, X-rays only indirectly, and like others I have found high frequency very stimulating to bacterial growth, and so if bactericidal in the end it is probably by causing overgrowth in the bacteria.

Do they act by adding energy to the living cells of the tissues proper, making them grow quicker and stronger and exercise their functions more energetically? Or do they act by setting up a reaction or irritation and causing leucocytosis to occur?

Probably they act in all of these ways, sometimes more in one way, sometimes more in another. That leucocytosis is an important factor I feel sure, but even in the case of X-rays I do not think it is leucocytosis that does *all* the good. The fact that several cases of lupus in distant parts healed while only one patch was being X-rayed rather tends to discountenance leucocytosis as the only factor, though I am not forgetting that when there is inflammation and local leucocytosis in one part of the body, there is an increase in leucocytes throughout the blood; but whether this increase is sufficient alone to cause such definite healing of lupus and rodent ulcer as has been seen in distant parts I very much doubt.

All these various forms of radiations are, we must remember, only variations of one and the same thing, all are electromagnetic perturbations in the ether of various wave length.

This is shown diagrammatically by this large diagram which I had made in 1897 for a paper which I was then reading.

You will see I have put recently a very large query against the position of X-rays, as we now perhaps make different guesses about them than we did some years ago. We must learn to find out and choose the radiations of wave length which are the most useful in each case that we have to treat by their help. I must thank Mr. Sutton for his help with the apparatus to-night, and the General Electric Co. for their kind loan of much of the apparatus.

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SOME ELECTRICALLY PRODUCED FORMS OF TREATMENT.

FORMS.	DISEASES.
1. HEAT.	
(*a*) Electric cautery	Moles, warts, nævi, pharyngitis, nasal complaints, hay fever.
(*b*) Wires heated by E. current (Greville)	Sprains, neuritis, myalgia, neuralgias, sciatica, lumbago, arthritis, contractures, to produce sweating in renal diseases.
(*c*) Incandescent E. lamps (Dowsing)	
(*d*) Arc lamps (combined with light)	
2. LIGHT.	
(*a*) From carbon arc lamps (Finsen, &c.)	Lupus, and lupus erythematosus.
(*b*) Blue, and ultra-violet arc lamps, iron arcs, Bang, Dermo, &c.	Rodent ulcer, epithelioma, some skin complaints, port wine stains.
(*c*) Vacuum arc lamps, iron electrodes (G. B. B.'s)	Some superficial carcinomas.
3. RÖNTGEN RAYS OR X-RAYS. (Becquerel and radium rays) ...	Lupus, rodent ulcer, epithelioma, carcinoma, carcinomatous ulceration and superficial nodules, sarcoma, chronic psoriasis and eczema, trachoma and pannus, hypertrichosis.
4. ELECTRIC, PROPER.	
(*a*) Static electricity	Pain in case of morphia habit, &c., neuralgias, nerve complaints.
(*b*) Continuous current (by baths, &c.)	Electrolysis of hairs, malnutrition.
(*c*) Alternating or sinusoidal (by baths, &c.)	Rheumatism, gout, rheumatoid arthritis.
Polyphase alternating ...	Lumbago, sciatica.
(*d*) Faradic	After paralysis, &c.
(*e*) Rectified	Same as *b*, *c*, *d*.
(*f*) Oscillating current, or high frequency	Trachoma and pannus, lupus and lupus erythematosus, rodent ulcer and callous ulcers, phthisis, surgical tubercle, rheumatism, gout, rheumatoid arthritis, lumbago, sciatica, neuritis, hæmorrhoids, fissures of anus, colitis (muco membranous), chronic psoriasis and eczema, warts, neurasthenia, to increase weight, to diminish sugar in diabetes.

Messrs. J. H. CLARKE and HALL-EDWARDS discussed the paper.

The meeting then concluded.

IT is proposed to hold an Electrotherapeutic Congress at the forthcoming International Exposition, to be held at St. Louis next year. Those who approve, or wish to take part in it are desired to communicate with R. G. Brown, Esq., 158, Montagu Street, Brooklyn, New York.

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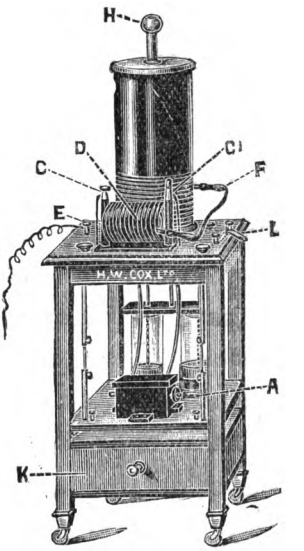

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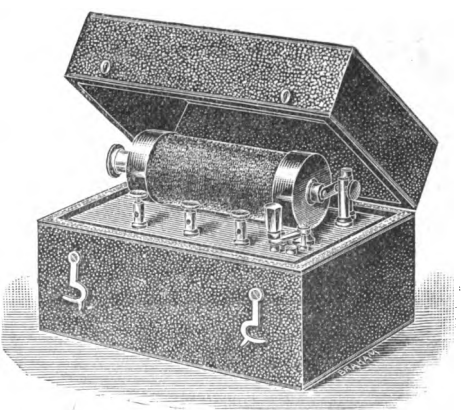

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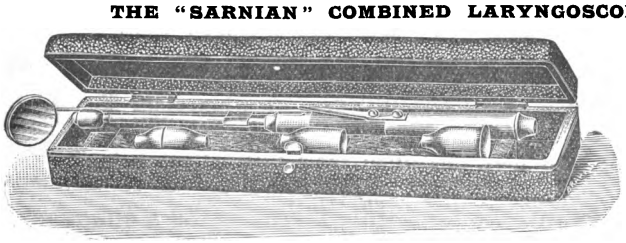

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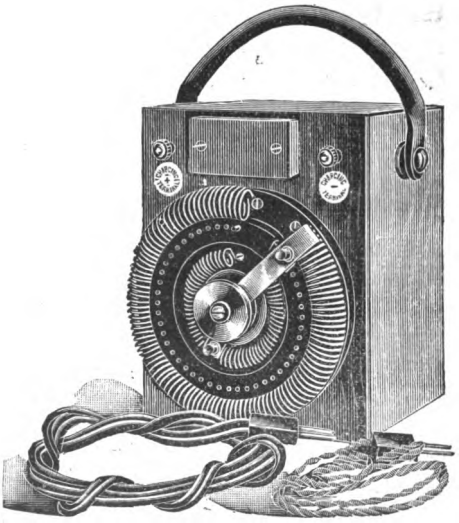

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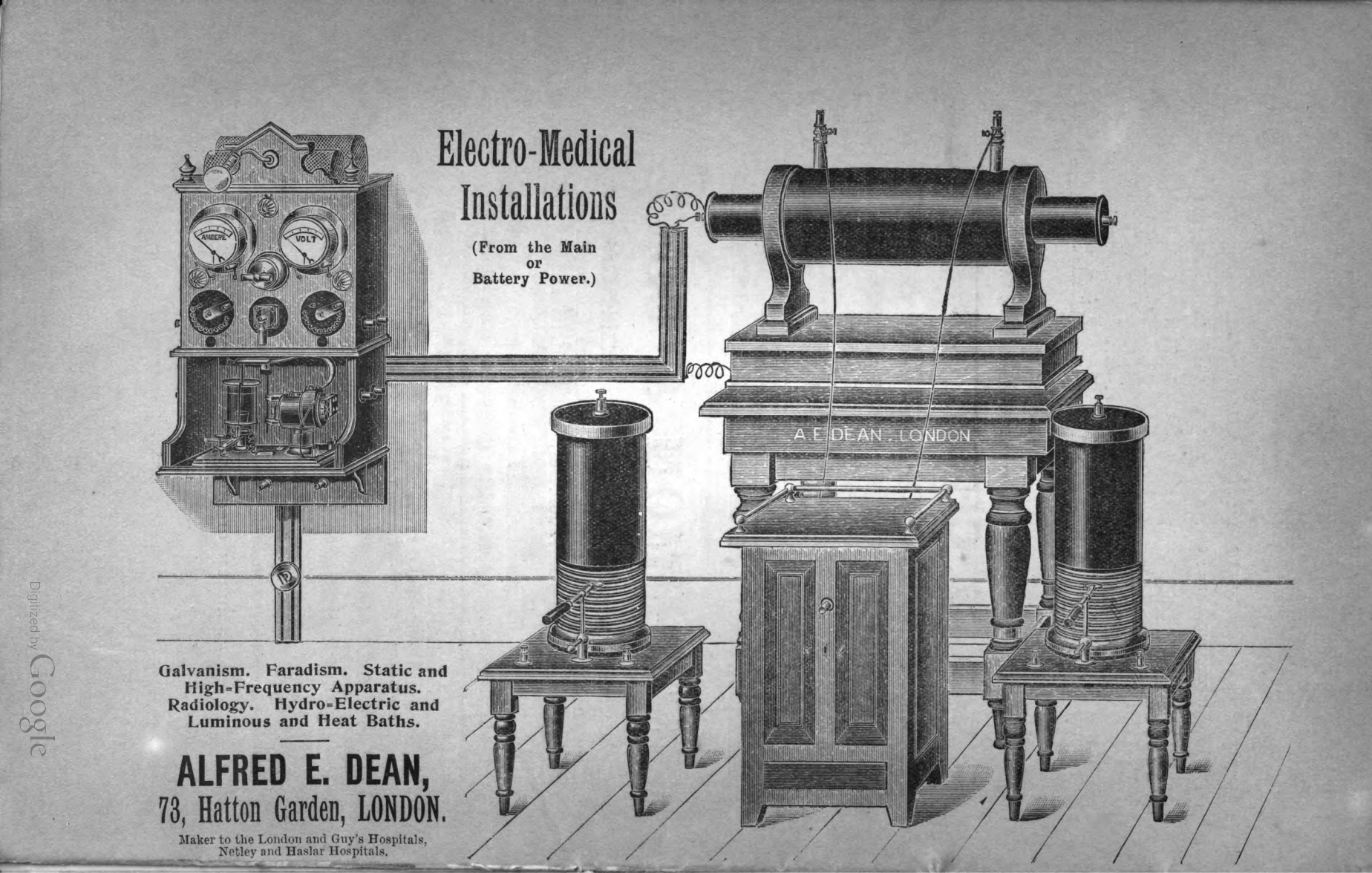

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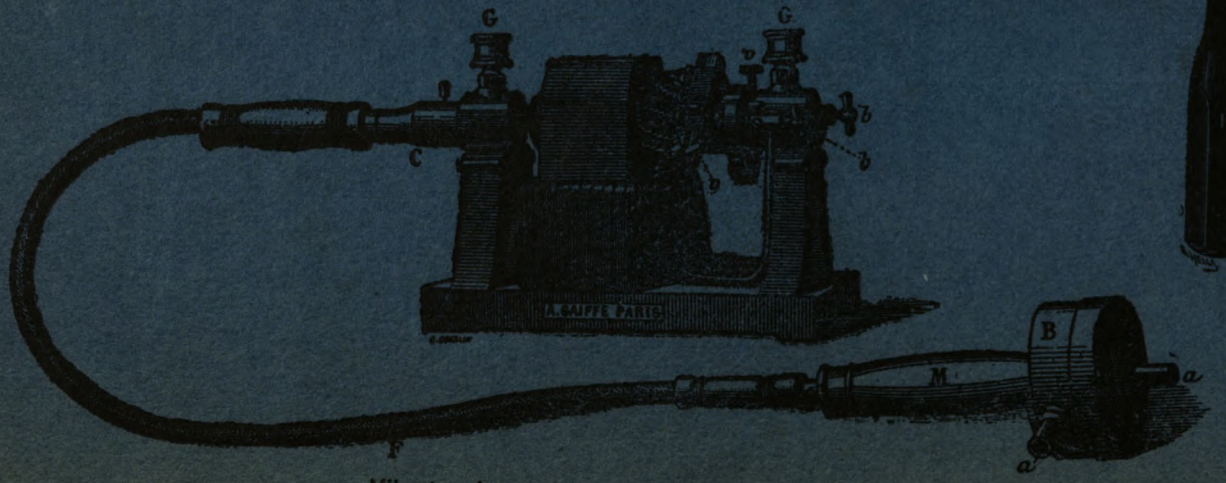

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